

JPRS-ULS-87-004

10 JULY 1987



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# ***JPRS Report***

# **Science & Technology**

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***USSR: Life Sciences***

10 JULY 1987

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## SCIENCE &amp; TECHNOLOGY

## USSR; LIFE SCIENCES

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INCREASE IN DISEASE RESISTANCE OF ONION USING A BIOGENOUS INDUCER OF DEFENSE REACTIONS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 1, Jan 87 (manuscript received 9 Jun 86) pp 71-74

[Article by A. P. Dmitriev, V. A. Tsybulnik and G. Yu. Perkovskaya, presented by K. M. Sytnik, academician of the Ukrainian SSR Academy of Sciences; Institute of Plant Physiology, Ukrainian SSR, Academy of Sciences, Kiev, Scientific Research Institute of Vegetable Growing and Cucurbit Cultivation of the Ukrainian SSR State, Agricultural Industry, Kharkov]

[Text] Attempts are being made to find new ways to protect plants based on strengthening the phytoimmunity and increasing the natural resistance of plants in order to decrease harvest losses due to disease and pests in many countries of the world. One of the most important reactions of phytoimmunity is the formation of antibiotic substances, phytoalexins, which are synthesized in the tissues of superior plants in response to contact with pathogens and through rapid accumulation are capable of suppressing the development of infectious microorganisms [1, 2]. In some cases, the amount and speed of formation of phytoalexins correlates directly to the resistance of plants to diseases [3-5]. Recently, metabolites of phytopathogenic fungi have been discovered which are recognized as host plants and serve as inducers of defense reactions, including the synthesis of phytoalexin. In small concentrations, these compounds result in the formation of trace amounts of phytoalexin, for example in potatoes; however, plants treated with them acquire resistance to subsequent infestation by pathogens [6, 7].

We previously [8] determined that nonspecific pathogens, with regard to which the onion has specific immunity, induce a significantly greater phytoalexin activity than fungi which are specific or nonpathogenic for the given plant. This report presents the best way to induce defense reactions in the onion using a biogenous inducer, which is extracted from the mycelium of several fungi of the *Fusarium* species.

The following cultures of fungi served as research subjects: *Fusarium solani* and *Fusarium oxysporum* - widely specific pathogens which are capable of infecting a weakened or damaged onion, and also *Fusarium moniliforme*\* - a

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\* Cultures of fungi obtained from the Department of Physiology and Classification of Microorganisms of the Institute of Microbiology and Virology, Ukrainian SSR Academy of Sciences.

Table 1. Induction of Phytoalexin Activity in the Onion Using Various Phytopathogens

(1) Патоген	(2) Индуктор	(3) Содержание в 1 мл	Прорастание тестовых спор (4)	
			(5) Число пророс- ших спор на 100	(6) % от конт- роля
(7) Контроль (этило- вый спирт)	—	—	95,7	100
<i>F. solani</i> (8)	Суспензия конидий	$2 \cdot 10^8$	14	15
	Экстракт мицелия			
	водный	2,0 мг	20	21
	спиртовой	2,0 мг	42	44
(10) <i>F. oxysporum</i>	Культуральный фильтрат	—	59	62
	Суспензия конидий (11)	$2 \cdot 10^8$	23	24
(12)	Экстракт мицелия водный	2,0 мг	28	29
	Культуральный фильтрат (13)	—	72	75
<i>F. moniliforme</i>	Суспензия конидий (14)	$2 \cdot 10^8$	26	27
(15)	Экстракт мицелия водный	2,0 мг	44	46
(16)	Культуральный фильтрат	—	76	79

Key:

- |                                       |                              |
|---------------------------------------|------------------------------|
| 1. Pathogen                           | 9. Mycelium extract          |
| 2. Inducer                            | aqueous                      |
| 3. Content in 1 ml                    | alcohol                      |
| 4. Germination of test spores         | 10. Culture filtrate         |
| 5. Number of germinated spores in 100 | 11. Conidium suspension      |
| 6. % of control                       | 12. Aqueous mycelium extract |
| 7. Control (ethyl alcohol)            | 13. Culture filtrate         |
| 8. Conidium suspension                | 14. Conidium suspension      |
|                                       | 15. Aqueous mycelium extract |
|                                       | 16. Culture filtrate         |

pathogen which does not infect the onion in nature. Cultures of pathogens were maintained on nutrient agar and some mycelium was cultivated in a liquid Chapek medium. Mycelium of fungi was cultivated mechanically, extracted using water and centrifuged at 3000 g for 30 min. The extract concentration was calculated according to volume of wet mycelium (dried on filter paper) to volume of water. In certain cases, 70% ethyl alcohol was used to extract the mycelium. The ability of the filtrates and extracts to induce phytoalexin activity during the monthly foliations of the onion was determined using the modified method of condensed diffusates [9]. The collected diffusates were extracted three times using benzene, evaporated at 40°C, redissolved in ethyl alcohol and tested for fungi toxicity.

The results obtained demonstrated that the conidium suspension, cultured filtrates and mycelium extracts differed in their ability to induce phytoalexin activity in the tissues of the acicular species of onion, *Strigunov*. The conidium suspension and *F. solani* mycelium extracts had the

greatest inducing activity, particularly the aqueous mycelium extract of this fungus, which is 2.1-fold more active than the alcohol extract (Table 1.) The filtrates of culture liquids of *F. solani* and *F. oxysporum* have a relatively weak inducing effect on the phytoalexin activity of condensed diffusates, and the culture filtrate, *F. moniliforme*, had the least inducing activity.

Table 2. The Effect of Spraying Vegetative Onion Plants with an Inducer from *F. solani* on Infestation with *Peronospora*.

(1) Способ обработки	(2) Распространение болезни, %		(3) Степень развития болезни, %	
	(4) Июль	(5) Август	(6) Июль	(7) Август
(8) Вода (контроль)	(9) Сорт Стригуновский			
(10) Индуктор	79,68	100,0	5,69	72,53
(10) Индуктор	37,12	100,0	1,97	56,33
(8) Вода (контроль)	(9) Сорт Сквирский			
(10) Индуктор	92,73	100,0	7,43	74,55
(10) Индуктор	56,07	100,0	2,28	62,91
(8) Вода (контроль)	(9) Сорт Октябрьский			
(10) Индуктор	86,35	100,0	6,12	76,18
(10) Индуктор	47,72	100,0	2,09	58,24

Key:

- |                                        |                      |
|----------------------------------------|----------------------|
| 1. Type of treatment                   | 6. Strigunov species |
| 2. Dissemination of disease, %         | 7. Skvir species     |
| 3. Degree of development of disease, % | 8. Oktyabr species   |
| 4. July                                | 9. Water (control)   |
| 5. August                              | 10. Inducer          |

An aqueous extract of *F. solani* mycelium with a high phytoalexin inducing ability was selected as the preparation for increasing the resistance to disease of the onion. We treated the onion plant with small doses of inducer, which caused only traces of phytoalexin in the plants, i.e., sensitizing the latter. A study of the dependence of phytoalexin activity of diffusates on the concentration of the extract of *F. solani* mycelium demonstrated that dilution of the inducer, consisting of 0.025% by volume of wet mycelium (0.25 mg/ml), induced only weak phytoalexin activity. We took this dose of biogenous inducer as the sensitizing dose.

In order to avoid any loss of activity in the biogenous inducer, it was sterilized by autoclaving at 1 atm. for 30 min. This treatment does not reduce the inducing activity of the preparation.

The defense reaction of the biogenous inducer of resistance against the most harmful disease in the onion, peronospora or downy mildew, was tested in the field at the Scientific Research Institute of Vegetable Growing and Cucurbit Cultivation of the Ukrainian SSR State Agriculture Industry (Kharkov) in 1984-1985. The dimensions of the plots of land were 10 m<sup>2</sup>, quadruple



repetition. The onions were treated with an inducer using two methods: presowing wetting of the seeds directly prior to sowing and spraying of the vegetative plants for two days before their artificial infestation with a specific pathogen, *Peronospora destructor*, the peronospora pathogen. An account of the development of the disease was carried out in accordance with the standard scale.

Presowing wetting of seeds in a solution of inducer increases the number of germinating plants and the speed of their growth compared with the control. Apparently, the more intensive growth of plants from the treated seeds can be explained by a decrease in the infestation of seedlings with root rot.

As a result of spraying vegetative plants during growth of the leaves with biogenous inducer for two days prior to their artificial infestation with *P. destructor*, the dissemination of the disease and degree of its development were reduced (Table 2). In plants treated with the inducer, the disease was primarily manifested in the form of isolated necrotic spots 3-4 mm in diameter, and the spore-carrying capacity of the fungus was detected within a narrow band (2-3 mm) surrounding the necrotic spot, while at the same time in untreated variants or those treated with water (control), large necrotic spots covered approximately 1/3 of the upper surface of the leaves and its spore-carrying capacity was great. A reduction in the growth of peronospora was noted in variants which had been treated with the inducer during the entire vegetation period after infestation with *P. destructor*.

Thus, we determined the best way to increase the disease resistance of the onion using a biogenous inducer of defense reactions, an extract of *F. solani* mycelium. Such immunization is apparently based on the ability of onion plants to identify certain compounds of phytopathogen which act as resistance inducers. In a relatively low concentration (0.025%), a biogenous inducer sensitizes the plant tissue, as a result of which it quickly and efficiently activates its defense reaction system, particularly the formation of phytoalexin, during subsequent contact with the peronospora pathogen. Since the biogenous inducer we used acts according to the same principle with which plants protect themselves under natural conditions, it can be assumed that its use for increasing the natural resistance of plants to disease will not pollute the environment or destroy microorganism populations as has been the case when treating crops with fungicides.

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12793/12947  
CSO: 1840/486

## USE OF MULTI-DIMENSIONAL STATISTICS TO SELECT PARENTAL COUPLES: EXPERIMENTAL CHECKING ON SPRING WHEAT

Kiev TSITOLOGIYA I GENETIKA in Russian Vol 20, No 6, Nov-Dec 86 (manuscript received 28 Aug 85) pp 452-457

[Article by T. V. Dobrotvorskaya, A. I. Sedlovskiy and S. P. Martynov, Institute of Botany, KaSSR Academy of Sciences, Alma-Ata; Scientific Research Institute of Agriculture; Southeastern NPO "Elita Povolzhya" Saratov]

[Abstract] Results of an experimental check of the possibility of using multi-dimensional statistical methods in selection of parental forms for hybridization of spring common wheat are presented and discussed. In 1980, 58 cultivars and forms of spring common wheat were grown. Standard varieties of Saratovskaya 29 (C29) and Kazakhstanskaya 3 (K3) were crossed with all of the other varieties and 6 combinations with participation of C29 and K3 were selected from 116 simple hybrids. Hybrids of these 12 combinations were brought to  $F_5$  by the method of progeny of single seeds in 1980-1981 and grown under field conditions found in Alma-Ata in 1982 ( $F_5$ ) and 1983 ( $F_6$ ). Statistical analysis showed no statistical associations between the genetic variance and divergence of the parents. Assessment of genetic divergence of the parents cannot serve as the only criterion of the effectiveness of crossing. Data obtained confirmed the hypothesis, based on a two-component algorithm of selection of parental forms, in which requirements for a high degree of pronouncement of selection traits in the hybrid population and the genetic divergence of the parents are formalized. This algorithm may be used to predict the effectiveness of crossing by results of a study of the parents. References 8: 5 Russian, 3 Western.

2791/12947  
CSO: 1840/543

## CYTOGENETIC STUDY OF INTERMEDIATE AND HEXAPLOID FORMS, ISOLATED FROM OCTOPLOID TRITICALE POPULATIONS

Kiev TSITOLOGIYA I GENETIKA in Russian Vol 20, No 6, Nov-Dec 86 (manuscript received 30 May 85) pp 441-445

[Article by P. I. Steepochkin and A. G. Dymova, Siberian Scientific Research Institute of Plant Breeding and Selection, Krasnoobsk Village, Novosibirsk Oblast]

[Abstract] Some possibilities and approaches to the study of deploidization of 8X triticales and stabilization of the hexaploid level of forms isolated from populations of 8X amphidiploids by means of anatomical and morphological

and cytogenetic analyses of the plants were described and discussed. Morphological studies were performed on 8 octoploid triticale strains C, C and C. Deploidization occurred throughout the 3 generations in all studied octoploid triticale strains, obtained by crossing wheat and rye and by doubling the number of chromosomes of hybrids, bred in isolation from other plants. In terms of all plants studied, morphologically wheat-type plants occurred in 11 percent while hexaploid triticale-type plants occurred in 1 percent. Wheat-type plants increased to 67 percent in C while hexaploid triticale types remained at virtually the same level. The karyotype of some wheat forms contained single arms of entire rye chromosomes. The wheat forms isolated from populations of cytogenetically unstable 8X triticale seeds are of interest as starting material in selection. Figure 1; references 12: 8 Russian; 4 Western.

2791/12947  
CSO: 1840/543

UDC 581.19:547

#### ORCHARD GRASS (*DACTYLIS GLOMERATA*) PROLAMINES

Moscow BIOKHIMIYA in Russian Vol 51, No 5, May 86 (manuscript received 4 Jul 85) pp 754-761

[Article by A. V. Konarev, I. O. Vvedenskaya and S. V. Shiyapnikov, All-Union Scientific Research Institute of Plant Sciences imeni N. I. Vavilov, Leningrad; Institute of Molecular Biology, USSR Academy of Sciences, Moscow]

[Abstract] Conventional peptide chemistry techniques were employed in a study on the prolamines of orchard grass (*Dactylis glomerata*), with ion-exchange chromatography yielding three components designated as  $\alpha_3$  (A3),  $\alpha_1$  (A1) and BP4. The molecular weights for these components were established at 27,000, 23,000 and 17,000 daltons, respectively, by means of polyacrylamide gel electrophoresis. The amino acid composition of A3, A1 and BP4 corresponded to that generally observed for prolamines: high levels of glutamic acid (or glutamine) and of proline. In A3 and BP4 the levels of lysine were somewhat greater than seen in wheat alpha-gliadin, accounting for 1.4 and 1.1% of the amino acids. Further evidence for the prolamine classification of these proteins was provided by amino acid sequencing of the N-terminal end of BP4. At positions 16-20 the -Gln-Gln-Gln-Pro-Phe sequence was identified, which had previously been reported for wheat gliadins. Figures 3; references 41: 12 Russian, 29 Western.

17172/12947  
CSO: 1840/505

SYNTHESIS OF PLASMALEMAL PROTEINS BY POTATO TUBERS IN RELATION TO  
SUSCEPTIBILITY TO PHYTOPHTHOROSIS

Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 22, No 2,  
Mar-Apr 86 (manuscript received 14 Nov 83) pp 272-280

[Article by N. V. Lyubimova and G. R. Verulidze, Institute of Biochemistry  
imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] Plasmalemmal preparations of Yantarnyy potatoes were employed in a study designed to assess protein biosynthesis and its activation as an indicator of resistance to phytophthorosis. The incubation of  $^{14}\text{C}$ -leucine was conducted with disks secured from the internal phloem segment of the tubers (50 g, 3 x 18 mm), to evaluate synthesis of plasmalemmal proteins. Analysis of TCA-insoluble fractions demonstrated that maximum uptake of the label occurred within 2 h of incubation at room temperature (24°C) in a moist chamber, with protein biosynthesis completely inhibited by incubation of 4°C or disk pretreatment with cycloheximide. With an increase in the duration of incubation and/or mechanical trauma the potential for activation of plasmalemmal protein synthesis diminished, a factor correlated with diminished resistance to phytophthorosis. These observations indicate that mechanical trauma may elicit general derepression of the genetic apparatus, leading to synthesis of--among other factors--surface receptors for pathogens or their products. Figures 2; tables 8; references 24: 9 Russian, 15 Western.

12172/12947  
CSO: 1840/548

BIOSYNTHESIS OF RESTRICTION ENDONUCLEASE Sal GI AND OPTIMAL CONDITIONS FOR ITS ISOLATION

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian, Vol 22, No 6, Nov-Dec 86 (manuscript received 4 Dec 84) pp 736-741

[Article by La Syn Ren, Ye. N. Oreshkin and Yu. P. Grachev, Moscow Technological Institute of the Food Industry]

[Abstract] Restriction endonuclease Sal GI isolated from *Streptomyces albus* G "recognizes" unique sites on DNA and breaks both DNA chains to form 5' -phosphate and 3' -hydroxyl ends. The purpose of the present article is to study the influence of cultivation conditions on the accumulation of the restriction endonuclease, to optimize the composition of the nutrient medium by mathematical methods of experimental planning, and to study conditions of isolation of Sal GI restriction endonuclease from *Streptomyces albus* G. Maximum Sal GI restriction endonuclease activity is accumulated in the biomass during the logarithmic growth phase, after which the relative content of the enzyme begins to drop. The optimization program established that the maximum biosynthesis of the enzyme occurred in a medium with the composition (in g/l): Glucose 13.0, peptone 5.2,  $K_2HPO_4 \cdot 3H_2O$  5.0,  $KH_2PO_4$  2.0,  $MgSO_4 \cdot 7H_2O$  0.5, yeast extract 4.0, pH 7.5. The optimal cultivation time for production of the maximum quantity of enzyme is 18-20 hours. The optimal concentration of Streptomycin sulfate and polyethyleneimine is 1.8-2.0 and 0.2-0.3%. The optimal concentration of ammonium sulfate for precipitation of the enzyme is 70% of saturation. Figures 4; references 17: 5 Russian, 12 Western.

6508/12947

CSO: 1840/552



## INFLUENCE OF MODIFICATION OF NEUROTOXIN II OF NAJA NAJA OXIANA ON STOICHIOMETRY OF ITS COMPLEXES WITH ACETYLCHOLINE RECEPTOR

Moscow BIOORGANICHESKAYA KHIMIYA in Russian, Vol 12, No 4, Apr 86 (manuscript received 30 Sep 85) pp 448-456 (3)

[Article by A. A. Karelin, K. A. Pluzhnikov and V. I. Tsetlin, Institute of Bioorganic Chemistry, imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Derivatives of neurotoxin II from *Naja naja oxiana* cobra venom carrying a spin or fluorescent label in various molecule sectors are close analogs, in terms of spatial characteristics, of the natural neurotoxin. These monomodified derivatives have high toxicity and bond effectively with nicotinic acetylcholine receptors isolated from the electric organ of the skate *Torpedo marmorata*. After irradiation of the complex of this receptor

with the neurotoxin containing a p-azidobenzoyl group in position Lys<sup>25</sup>, it can form up to 4 additional bonding sectors specific for acetylcholine and neurotoxin II but not for a "long" type neurotoxin. The formation of additional bonding sites is found to depend on the activity of the receptor preparations and the mutual influence of the two basic toxin-binding centers in the process of formation of additional binding sectors. Figure 1; references 29: 8 Russian, 21 Western.

6508/12947

CSO: 1840/440

ISOMERIZATION OF TRIFLUOROACETAMIDOPROPYL-2-ACETAMIDO-2-DESOXY- $\beta$ -D-GALACTOPYRANOSIDE TO  $\alpha$ -ANOMER. CONVENIENT METHOD OF SYNTHESIS OF ARTIFICIAL T-ANTIGEN

Moscow BIOORGANICHESKAYA KHIMIYA in Russian, Vol 12, No 4, Apr 86 (manuscript received 11 Sep 85) pp 533-538

[Article by N. V. Bovin, Scientific Research Institute of Prepared Medications, USSR Ministry of the Medical Industry, Moscow, T. V. Zemlyanukhina and A. Ya. Khorlin, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] The Thompson-Fridenreich (T) antigen is an important marker for processes of differentiation and oncotransformation of cells. Since the T-antigen is of interest for practical medicine, several groups of researchers have synthesized artificial T-antigens and immunosorbents of corresponding specificity. In order to produce multispecific antibodies recognizing only  $\alpha$ -disaccharide, the authors have developed an artificial T-antigen carrying monotypic determinants. The key  $\alpha$ -glycoside  $\text{GalNAc}\alpha 1\text{-O}(\text{CH}_2)_3\text{NHCOCF}_3$ - (peracetate) was obtained by isomerization of the  $\beta$ -anomer under the influence

of trifluoromethane sulfoacid as well as direct glycosylation of 3-(trifluoroacetamido)propanol by D-galactosamine peracetate in the presence of a mixture of trifluoromethane sulfoacid and boron trifluoride etherate. The benzylidene derivative was then produced and glycosylated with acetobromogalactose. Removal of protective groups results in (3-aminopropyl)bioside, immobilized on ox serum albumin and cytochrome c. References 26: 4 Russian, 22 Western.

6508/12947  
CSO: 1840/440

UDC 577.152.311'143

#### SELECTIVITY OF ACTION OF THIOPHOSPHONATE STEREOISOMERS WITH ASYMMETRICAL PHOSPHORUS ATOM ON CHOLINESTERASE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian, Vol 12, No 9, Sep 86 (manuscript received 4 Oct 85; after revision 27 Jan 86) pp 1164-1171

[Article by G. M. Grigoreva and T. I. Krasnova, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; A. A. Abduvakhabov and V. S. Abdukakharov, Institute of Bioorganic Chemistry, SSR Academy of Sciences, Tashkent]

[Abstract] In order to seek differences in stereospecificity of cholinesterase in mammals and insects and to construct selective insecticides on this basis, the authors studied the effects of derivatives of methylthiophosphonic acid with asymmetry in the central phosphorus atom on cholinesterase. It was found that the compounds have complex action on cholinesterase, including progressive and irreversible inhibition plus additional inhibition of the activity of the enzyme at the initial moment of the reaction. The kinetics of inhibition of the enzymes were analyzed according to the 2-stage reaction scheme assuming formation of a noncovalent complex of the enzyme with the inhibitor. The inhibition properties of the stereoisomers were found to differ. The stronger inhibitor contained sulfide sulfur in the split portion which, having manifest electronegativity, can join with the polar groups in the active center of the enzyme. The selectivity of action of the stereoisomers also depends on the structure of the radicals at the phosphorus atom. Considering that inhibition of the active center of acetylcholinesterase in the nervous system is the major element in the mechanism of action of organophosphorus pesticides, the use of the higher stereospecificity of insect acetylcholinesterase in comparison to the enzyme in mammals can be considered one direction promising for the search for selective insecticides. Figures 2, references 19: 10 Russian, 9 Western.

6508/12947  
CSO: 1840/444

# NUCLEOTIDE SEQUENCE OF GENOME SECTION OF TICK-BORNE ENCEPHALITIS VIRUS CODING FOR STRUCTURAL PROTEINS OF VIRION

Moscow BIOORGANICHESKAYA KHIMIYA in Russian, Vol 12, No 9, Sep 86 (manuscript received 6 Feb 86) pp 1189-1202

[Article by A. G. Pletnev and V. F. Yamshikov, Novosibirsk Institute of Bioorganic Chemistry, Siberian Department, USSR Academy of Sciences and V. M. Blinov, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] Direct studies of the structure of the genome of the tick-borne encephalitis virus (TEV) are difficult due to the high pathogenicity of the virus, the infectious nature of the viral RNA and the low virus titers achieved by cultivation on cells. The use of modern methods of molecular biology allows a direct approach to this study, bypassing the difficulties related to working with dangerous viral materials. This article reports cloning of DNA copies of TEV genome sectors in *E. coli* cells, summing up the results of studies of the structure of the TEV genome sector coding the viral structural proteins M, C and E. The amino acid sequences of the TEV structure protein are compared to those of the yellow fever and Western Nile viruses. High homology of the structure proteins of these viruses is found. Conservatism is observed both at the nucleotide and at the amino acid levels in the organization of the flaviviruses. The genomes have a common sequence of genes in RNA and apparently a common strategy of gene expression. The structural organization of the flavivirus genome is basically different from that of the alphaviruses, also in the family Togaviridae. Figures 2; references 29: 6 Russian, 23 Western.

6508/12947

CSO: 1840/444

UDC 576:547.963.3

# TEMPLATE-FREE RIBOSOMAL SYNTHESIS OF PEPTIDES FROM AMINOACYL-tRNA: SYNTHESIS OF POLYPHENYLALANINE FROM PHENYLALANYL-tRNA<sup>Lys</sup>

Kiev BIOPOLIMERY I KLETKA in Russian, Vol 2, No 4, Jul-Aug 86 (manuscript received 10 Feb 86) pp 185-189

[Article by G. Zh. Yusupova (Tnalina), N. V. Belitsina and A. S. Spirin, Institute of Protein, USSR Academy of Sciences, Pushchino; Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] Ribosomes of *Escherichia coli* can utilize lysyl-tRNA and certain other aminoacyl-tRNA as substrates for synthesis of polypeptides when no matrix polynucleotide is present. The best substrates are lysyl-, seryl- threonyl- and aspartyl-tRNA. Prolyl-, phenylalanyl- and asparaginyl-tRNA are practically

inactive as substrates. This article studies pseudoacylated tRNA to determine whether the effectiveness of aminoacyl-tRNA as a substrate for template-free synthesis is determined by the structure of the tRNA or the nature of the amino acid group. It is shown that phenylalanyl tRNA<sup>Lys</sup> can act as a substrate for the synthesis of homopeptides on ribosomes when poly(A) is not present, indicating that the structure of the tRNA determines the capability of the aminoacylated tRNA<sup>Lys</sup> to participate in elongation of the peptide without codon-anticodon pairing. Figures 5; references 12: 2 Russian, 10 Western.

6508/12947  
CSO: 1840/436

UDC 547.964.4:543.422.23

TRANSMEMBRANE CHANNEL OF GRAMICIDIN A. RECONSTRUCTION OF SPATIAL STRUCTURE  
BASED ON NMR SPECTROSCOPIC DATA AND OPTIMIZATION OF CONFORMATION ENERGY

Moscow BIOLOGICHESKIYE MEMBRANY in Russian, Vol 3, No 11, Nov 86 (manuscript received 4 Jun 86) pp 1077-1104

[Article by A. S. Arsenyev, A. L. Lomize, I. L. Barsukov and V. F. Bystrov, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

Abstract] A previous article utilized NMR spectroscopy to demonstrate that gramicidin-A (GA) complexes in anion micelles with ions of Li<sup>+</sup>, Na<sup>+</sup> and Tl<sup>+</sup> form a channel of two right individual  $\pi$  spirals associated N-end to N-end and that it is this structure which is responsible for the ionophoric properties of GA in bilayer membranes. This article additionally determines the orientation of side chains of the transmembrane GA channel and undertakes energy optimization of its spatial structure considering the limitations following from the NMR spectroscopic data. The possibility is also analyzed of conformation restructuring of the molecule. The methodology and software developed in this work allow reconstruction of the spatial structure, determination of mobile sectors and study of the conformation capabilities of the GA transmembrane channel. The relationship of the spatial structure and functions of the transmembrane channel are described. Pores about 4 Å in diameter are located along the axis of the right spatial, through which monovalent cations and water molecules overcome the hydrophobic barrier of the membrane. On the outer surface of the spiral are hydrophobic side chains of aminoacid groups, supporting optimal interaction of the channel with lipids. The results obtained are valid only for the "open" or conducting state of the GA channel. Figures 4; references 63: 4 Russian, 59 Western.

6508/12947  
CSO: 1840/485



## ACTIVATION OF TRANSDUCIN AND PHOSPHODIESTERASE BY DELIPIDIZED RHODOPSIN IN DETERGENT SOLUTION

Moscow BIOLOGICHESKIYE MEMBRANY in Russian, Vol 3, No 11, Nov 86 (manuscript received 14 Apr 86) pp 1172-1174

[Article by V. Yu. Arshavskiy, A. M. Dizhur, M. P. Antoch, S. V. Rakhilin and P. P. Filippov, Moscow State University imeni M. B. Lomonosov; Interfaculty Scientific Research Problem Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy]

[Abstract] Data are presented indicating that purified, delipidized rhodopsin retains significant functional activity in model rhodopsin-transducin and rhodopsin-transducin-phosphodiesterase systems in an aqueous solution of octylglucoside. Both of the systems studied containing photosensitized rhodopsin have significant activity in the aqueous octylglucoside solution in the absence of membranes. The optimal detergent concentration is about 0.5-0.6%. In both cases, strict light dependence is observed: Both GTPase and phosphodiesterase are practically inactive in the dark, but are activated by a factor of at least 30 when exposed to light. The phosphodiesterase cascade reconstructed from purified delipidized rhodopsin and homogenized transducin and phosphodiesterase can thus function in an aqueous solution of octylglucoside without membranes. Figures 2; references 13: 2 Russian, 11 Western.

6508/12947

CSO: 1840/485

## SEPARATION AND INVESTIGATION OF IMMUNOCHEMICAL PROPERTIES OF MULTIPLE FORMS OF RAT LIVER CYTOCHROME P-450

Moscow BIOKHIMIYA in Russian Vol 51, No 11, Nov 86 (manuscript received 20 Jan 86) pp 1811-1820

[Article by V. I. Nechayev, L. R. Ptitsyn, A. A. Kabishev, L. A. Ryazanova, L. I. Patrushev and A. N. Saprin, Division of Experimental Pathology, Scientific Research Institute of Biological Testing of Chemical Compounds, Moscow]

[Abstract] Multiple forms of rat liver cytochrome P-450 induced by phenobarbital (PB) and 3-methylcholanthrene (3MC) were separated chromatographically and characterized immunochemically using specific antibodies. In all, four P-450 forms were identified upon induction with PB and two after 3MC induction. Purification included chromatography on n-aminooctyl-Sepharose 4B, DEAE-Sepharcel and hydroxylapatite columns. It was shown that all of these P-450 cytochromes could be divided into two groups showing common antigenic determinants within but not across these groups. Using high efficiency liquid



chromatography separation, it was shown that some electrophoretically homogeneous forms of P-450 were actually heterogeneous. Figures 6; references 45: 5 Russian, 40 Western.

7813/12947  
CSO: 1840/511

UDC 577.158.8

IDENTIFICATION AND CHARACTERIZATION OF m-RNA RAT LIVER CYTOCHROME P-450  
INDUCED BY PHENOBARBITAL AND 3-METHYLCHOLANTHRENE

Moscow BIOKHIMIYA in Russian Vol 51, No 11, Nov 86 (manuscript received  
21 Jan 86) pp 1821-1828

[Article by A. A. Kabishev, V. N. Nechayev, L. A. Ryazanova, L. R. Ptitsyn,  
N. V. Batchikova, L. I. Patrushev and A. N. Saprin, Division of Experimental  
Pathology, Scientific Research Institute of Biological Testing of Chemical  
Compounds, Moscow]

[Abstract] In a continuation of studies of the mechanism of P-450 cytochrome biosynthesis, specific rat liver cells m-RNA were identified partially purified and characterized; principal forms of P-450 cytochrome induced by phenobarbital (PB) and 3-methylcholanthrene (3MC) were coded. During translation of the PB-induced m-RNA, a single polypeptide was obtained with molecular weight of 50,000; it was specifically immunoprecipitated by antibodies to major PB-inducible cytochrome P-450. After MC-m-RNA translation the antibodies to major MC-induced cytochrome MC-2 precipitated 4-5 polypeptides from the incubation mixture, the largest with molecular weight of 58,000. Centrifugation in a sucrose density gradient yielded PB- and MC-m-RNAs with sedimentation coefficients of about 18S and 20S respectively. In light of previous work, these m-RNA also probably are heterogeneous mixtures of several m-RNAs. Figures 4; references 19: 2 Russian, 17 Western.

7813/12947  
CSO: 1840/511

UDC 575.117.2:616-006.6

CATIONIC TRANSCRIPTION CONTROL OF SOME GENES IN TUMOR CELLS

Moscow BIOKHIMIYA in Russian Vol 51, No 11, Nov 86 (manuscript received  
7 Feb 86) pp 1893-1898

[Article by S. D. Kazmin and I. A. Smirnova, Institute of Oncology Problems  
imeni R. Ye. Kavetskiy, UkSSR Academy of Sciences, Kiev]

[Abstract] In earlier studies it was shown that injection of Balb/C mice with Rausher virus results in activation of cellular gene expressed by

synthesis of a new component of heterogenous nuclear poly(A)<sup>+</sup> containing RNA with sedimentation constant 35S. During the process of carcinogenesis, a gradual increase in the relationship between monovalent cations occurs in the tissue. In the present work, an attempt was made to find out whether activation of 35S-RNA coding gene is related to the Na<sup>+</sup>/K<sup>+</sup> ratio increase in tumor cells. Experiments were done on ascite tumor cells (Fhrlich carcinoma, plasmacytoma, MOPC-21, leukemia P-388 and lympholeucosis NK/L). It was shown that loci exist in a cellular genome whose genes are activated at strictly determined monovalent cation ratios. Altering this ratio leads to lower transcription activity or even its total repression. Mechanism of this action is based on a change in the properties of protein regulators or that of the tertiary or quaternary chromatine structure. This cationic regulation determines the time and sequence of switching on and off individual genes during movement of proliferating cells along the mitotic cycle. It also provides for the transcription of normally repressed genes as a result of malignant transformation. Figures 4; references 10: 8 Russian, 2 Western.

7813/12947  
CSO: 1840/511

UDC 547.963:576.3:+612.419

#### EFFECTS OF CRYOPRESERVATIVES ON TOPOLOGICAL TRANSITIONS IN SUPERHELICAL DNA OF HUMAN BONE MARROW NUCLEOIDS

Kiev KRIBIOLOGIYA in Russian No 1, Jan-Mar 86 (manuscript received 12 Jun 85)  
pp 34-38

[Article by T. N. Vashchenko, V. I. Vashchenko, G. I. Petrenko, Sh. M. Bagautdinov and S. P. Palko, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] A viscosimetric study was conducted to assess topological changes in superhelical DNA (shDNA) of human bone marrow cells before and after preservation with either dimethyl acetamide or polyethylene glycol. Assessment was conducted in terms of relaxation plots obtained by titration of the nucleoids with ethidium bromide. The use of the cryopreservatives demonstrated that the viscosity of shDNA increased. These observations were in agreement with the contention that fluctuations in temperature caused changes in topoisomerase function, altering their binding to shDNA. This change is accompanied by release of segments that retain the topoisomerase domains in the nucleoid, which is recorded as an increase in relative viscosity. These observations confirmed the value of viscosimetry in evaluation of topological transitions in shDNA of nucleoids, and may be used in defining the role of shDNA in cell viability in the process of cryopreservation. Figures 2; references 13: 8 Russian, 5 Western.

12172/12947  
CSO: 1840/534

## PROTEOLYTIC ACTIVITY OF ECHIS MULTISQUAMATUS VENOM

Tahkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 5, Sep-Oct 86  
(manuscript received 7 Mar 86) pp 659-660

[Article by B. V. Atakuziev, S. M. Leygerman and L. Ya. Yukelson, Institute of Biochemistry, UzSSR Academy of Sciences, Tashkent]

[Abstract] Echis multisquamatus snake venom is a valuable starting material for a number of biologically active compounds. It has not as yet been studied adequately. For example, there are practically no reports in the literature on composition and properties of the proteolytic enzymes in this venom which are responsible for the lethal effect and blood coagulation. It has now been shown that the venom contains a protease-resembling trypsin, that specific kininagenase and kininase are absent and that the activity of cathepsin is low. Figure 1; references 10: 7 Russian, 3 Western.

7813/12947  
CSO: 1840/461

UDC 547.639.5.07:542.95:543.422

## ALKYLATION OF BENZO- AND DIBENZOCROWN ESTERS WITH VARIOUS ALCOHOLS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 11, Nov 86  
(manuscript received 8 Apr 85, after final revision 12 Feb 86) pp 1461-1469

[Article by A. K. Tashmukhamedova, I. A. Stempnevskaya, N. Zh. Sayfullina and M. G. Levkovich, Tashkent State University imeni V. I. Lenin, Tashkent]

[Abstract] In previous studies it was shown that branching of the alkyl chain attached to phenyl rings affects ionophoric activity of crown esters. In the present work alkylation of benzo-15-crown-5, benzo-18-crown-6, dibenzo-18-crown-6, dibenzo-24-crown-8 and dibenzo-30-crown-10 esters was investigated. Alkylation occurred at 60-70°C in 2-5 hrs using a two fold excess of the alkylating agent (n- and isopropyl-, sec- and tert-butyl-, n- and tert-amyl-, allyl and benzyl alcohols and cyclohexanol) and a five-fold excess of polyphosphoric acid. Each structure was identified by PMR, IR and mass-spectroscopic data. Composition of individual reaction product mixtures and spectral characteristics were reported in detail. References 15: 11 Russian, 4 Western (2 by Russian authors).

7813/12947  
CSO: 1840/460

THERMAL INACTIVATION AND STABILIZATION OF LACTATE- AND MALATEDEHYDROGENASE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian, No 6, Nov-Dec 86 (manuscript received 4 Feb 85) pp 61-67

[Article by V. L. Markina, A. N. Yeremin and D. I. Metelits, Institute of Bioorganic Chemistry, BSSR Academy of Sciences]

[Abstract] Lactate- (LDH) and malatedehydrogenase (MDH) are used as enzyme markers in immunoenzymatic analysis of many antigens. The goal of the present work was to investigate kinetics of thermal inactivation of LDH and MDH in the temperature range 20-60°C, to characterize it quantitatively for various concentrations of proteins and to stabilize the enzymes with water soluble additives: inorganic salt additives, polyatomic alcohols and other polyols. It was shown that the inactivation rate constants are the functions of initial concentration of these enzymes. Thermal inactivation of tetrameric LDH and dimeric MDH was determined by their dissociation rate, i.e., breakdown of their quaternary structure. It was shown that inorganic salts and polyols proved to be effective stabilizers for these enzymes; some of these anions prevented dissociation of oligomers and by this inactivation of subunit proteins. Figures 3; references 23: 12 Russian, 11 Western.

7813/12947

CSO: 1840/459

## BIOPHYSICS

UDC 57.043:611.018.51:577.352

### FLUORESCENT PROBE ANALYSIS OF OSMOTIC EFFECTS ON MEMBRANE STRUCTURE OF INTACT ERYTHROCYTES AT 0 TO 37°C

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 (manuscript received 2 Sep 85)  
pp 14-18

[Article by L. A. Babychuk, M. M. Spirin, G. V. Belevich, V. A. Bondarenko and A. M. Belous, Institute of Problems in Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov; Scientific Research Institute of Physicochemical Medicine, RSFSR Ministry of Health, Moscow; 2nd Moscow Medical Institute imeni N. I. Pirogov]

[Abstract] A series of fluorescent probes were employed in a study on the protein-lipid interrelationships in human erythrocytic membranes as affected by osmolality of the medium and temperature. The temperatures were varied from 10 to 37°C and from 37 to 10°C in the presence of isotonic (0.15 M) NaCl and hypertonic (1.2 M) NaCl. Analysis of the data obtained by fluorescent quenching and excimerization [sound] studies demonstrated that they reflected structural parameters of protein-lipid interaction in the membranes. The basic processes appeared to involve conformational changes in the protein cytoskeleton, resulting in associated alterations in the related membrane lipids as well as internal proteins. The changes were slowly reversible, but conformational alterations induced in the proteins by the low temperatures and hypertonicity persisted to some extent. Figures 3; references 7: 5 Russian, 2 Western.

12172/12947  
CSO: 1840/536



## EFFECTS OF FREEZING CONDITIONS ON EXTRA- AND INTRACELLULAR CRYSTALLIZATION IN HUMAN ERYTHROCYTES

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 (manuscript received 2 Aug 85)  
pp 31-36

[Article by N. V. Repin, Institute of Problems in Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] An ultrastructural study was conducted on intra- and extra-cellular crystallization during freezing of human erythrocytes, using unprotected erythrocytes and cells equilibrated with 10, 20 or 30% glycerol. Studies on rates of freezing ranging from 200 to 50000 °C/min [sic] in the case of the unprotected cells showed compression of the cells by extracellular ice crystals. Compression of the red cells was accompanied by vesicle formation on the cellular surface at slow cooling rates, and in all cases marked distortion was evident. The rate of hemolysis exceeded 90% at 200 °C/min, decreasing to 50-60% at the higher rates of cooling. Slow freezing in the presence of 10, 20 or 30% glycerol avoided intracellular crystal formation, with extracellular crystals having smooth contours. At slow freezing rates the erythrocytes did not sustain any morphological changes. At higher rates (2000 °C/min) compressions of the cells was evident with unavoidable deformations. These factors have to be considered in designing optimum preservation systems for erythrocytes at low temperatures. Figures 4; references 9: 5 Russian, 4 Western.

12172/12947  
CSO: 1840/536

UDC 612.11/12

## EFFECTS OF HIGH PRESSURE AND LOW TEMPERATURE ON BIOLOGICAL OBJECTS

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 (manuscript received 21 Jul 85)  
pp 39-41

[Article by R. A. Pavlenko and Yu. A. Kudenko, Institute of Biophysics, Siberian Department, USSR Academy of Sciences, Krasnoyarsk]

[Abstract] An evaluation was conducted on the utility of high pressures and low temperatures on the preservation of animal cells, with primary studies conducted with human blood cells. The data revealed that the optimal conditions for preservation of human erythrocytes were represented by a pressure of  $3.92 \pm 0.49 \times 10^7$  Pa and a temperature of -4 or -5 °C. After 28 days of storage under these conditions the rate of hemolysis was only  $2 \pm 0.6\%$ . Studies on neutrophils preserved under identical conditions revealed that the level of phagocytic activity, as determined by chemiluminescence, corresponded to 80, 70 and 55% after storage for 7, 14 and 21 days, respectively. The

viability of the neutrophils determined by trypan blue exclusion was some 12% higher on the corresponding days. Basically similar results on the preservation of other animal cells were obtained, underscoring the wide application of this method for cell preservation. Figures 1; references 8: 5 Russian, 3 Western.

12172/12947  
CSO: 1840/536

UDC 57.043:577.37

#### CRYOSTABILITY AND STRUCTURE OF LIPOSOMES WITH ENCAPSULATED RIFAMPICIN AND TETRACYCLINE

Kiev KRIOBIOLOGIYA in Russian No 1, Jan-Mar 86 (manuscript received 8 Jul 85)  
pp 11-15

[Article by Yu. P. Blagoy, A. Ya. Tsyganenko, B. N. Zimoglyad, V. S. Leontyev, V. N. Vasilchenko and A. G. Shkorbatov, Physicotechnical Institute of Low Temperatures, Ukrainian SSR Academy of Sciences, Kharkov; Kharkov Medical Institute]

[Abstract] Cryostability and structure of lecithin liposomes encapsulating rifampicin and tetracycline were studied by polarized light scattering. The antibiotic:lecithin ratio for liposomes was maintained at 1:50 for rifampicin and at 1:75 for tetracycline. Freezing (78°K) and thawing studies demonstrated that the Z-average diameters of the liposomes were accurately determined under conditions involving inelastic light scattering complicated by light absorption. The rifampicin:lecithin liposomes retained their spherical structure in the course of freezing and thawing cycles, with the rifampicin bound to the lecithin component. By contrast, tetracycline was concentrated within the aqueous phase in the liposomes. The greater stability of the rifampicin:lecithin liposomes was attributed to the binding of the antibiotic to the lipid moiety, resulting in retention of complete anisotropic scattering for more than a week. Figures 5; references 4 (Russian).

12172/12947  
CSO: 1840/534

UDC 577.3:612.111.014.41

#### EFFECTS OF GEOMAGNETIC FIELD SHIELDING ON ERYTHROCYTES PRESERVED AT 4°C

Kiev KRIOBIOLOGIYA in Russian No 4, Oct-Dec 86 (manuscript received 2 Apr 85)  
pp 23-24

[Article by L. K. Stus and V. M. Kuraksa, Institute Problems in Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] Studies were conducted on the effects of shielding erythrocytes (from 26 donors) stored at  $4 \pm 2$  °C on the rate of acid hemolysis in the course

of storage. The shielding afforded a  $10^2$  - to  $5 \times 10^2$ -fold reduction in exposure to the geomagnetic field. The data demonstrated that, over a 22-day period of observation, the shielding had no significant effect on hemolysis during storage, although the graphical presentation of the hemolytic patterns during the period in question revealed differences between control and shielded erythrocytes. Figures 2; references 3 (Russian).

12172/12947  
CSO: 1840/538

UDC 577.345

EFFECTS OF MONO- AND MULTIATOMIC ALCOHOLS, APPROTONIC SOLVENTS, AND  
REPLACEMENT OF  $H_2O$  BY  $^2H_2O$  AND  $H_2^{18}O$  ON DYNAMICS OF PHOTOCHEMICAL CHARGE  
SEPARATION IN RHODOSPIRILLUM RUBRUM CHROMATOPHORES

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 20, No 5, Sep-Oct 86  
(manuscript received 27 Nov 85) pp 1305-1312

[Article by V. I. Godik, P. P. Noks, A. A. Kononenko, A. Yu. Borisov and  
A. B. Rubin, Interfaculty Problem Scientific Research Laboratory of Molecular  
Biology and Bioorganic Chemistry imeni A. N. Belozerskiy and the Biology  
Faculty, Moscow State University imeni M. V. Lomonosov]

[Abstract] Nanosecond recombinational fluorescence was employed in evaluating the significance of the water-protein interactions in the dynamics of charge separation in Rhodospirillum rubrum chromatophores. Replacement of water by  $^2H_2O$  decreased the lifetime of recombinational fluorescence more than 4-fold, indicating that stabilization of the intermediate ion radical  $P^F$  state involves clusters that include several protons. Replacement of water by  $H_2^{18}O$  had no such effect since it did not involve replacement of protons by deuterium. Alcohols and aprotonic solvents (glycerol, ethylene glycol, propylene glycol, dimethylformamide) had a similar effect on the lifetime due to their interaction with protein-bound water. The effects with the latter agents were directly correlated with their hydrophobicity. These observations indicated that the formation of an energy barrier preventing charge recombination in the porphyrin complex is a dynamic process coupled with proton rearrangement in the water-protein hydrogen bonds. Figures 2; references 15: 8 Russian, 7 Western.

12172/12947  
CSO: 1840/571

TRANSFORMATION OF STREPTOMYCES PROTOPLASTS BY CHROMOSOMAL AND PLASMID DNA  
ENCAPSULATED IN LIPOSOMES

Kiev BIOPOLIMERY I KLETKA in Russian Vol 12, No 5, Sep-Oct 86 (manuscript  
received 22 Jul 85) pp 270-274, 278

[Article by A. S. Stenko, B. P. Matselyukh, T. D. Dekhtyarenko, Ye. Ye.  
Stefanishin, A. V. Stefanov, N. K. Bezkorovaynaya, L. V. Polishchuk and  
N. N. Mashkovskiy, Institute of Microbiology and Virology, Ukrainian SSR  
Academy of Sciences, Kiev]

[Abstract] An evaluation was conducted on the transformation of several strains  
of *Streptomyces griseus* protoplasts by chromosomal and plasmid DNA encapsulated  
in liposomes prepared from egg lecithin. The efficiency of DNA uptake by the  
liposomes was ca. 8%. The efficiency of transformation with the encapsulated  
chromosomal DNA and plasmids pSG1912 ant<sup>+</sup> and pIJ2Neo<sup>r</sup> was on the order of  
2- to 3- orders of magnitude greater than with unencapsulated DNA. Plasmid  
pSG1912 remained stable over 6-7 generations in the transformed cell, migrating  
with the typical mobility of the starting plasmid in agarose gel. After 12  
generations, neither pSG1912 nor pIJ2 could be isolated, although the trans-  
formed cells retained their acquired phenotypes. The latter suggest that the  
plasmids became incorporated into the chromosome. Figures 3; references 22:  
3 Russian, 19 Western.

12172/12947  
CSO: 1840/437

KINETIC CHARACTERISTICS OF TYROSINE SYNTHESIS CATALYZED BY FREE AND IMMOBILIZED BACTERIAL CELLS. EFFECT OF REAGENT MASS TRANSFER ON KINETICS OF TYROSINE-PHENOL-LIASE IN CELLS

Moscow BIOKHIMIYA in Russian Vol 51, No 11, Nov 86 (manuscript received 5 Nov 85) pp 1768-1775

[Article by I. V. Tsyachnaya, M. Kh. Rodrigues, V. I. Yakovleva and I. V. Berezin, Chemistry Faculty, Moscow State University imeni M. V. Lomonosov]

[Abstract] *C. freundii* cells with high tyrosine-phenol-liase activity were obtained in an immobilized state in polyacrylamide gel and in 3.5% carrageenan and some of their properties were studied prior to this work in which kinetic characteristics of the synthesis of tyrosine was investigated using free and immobilized cells. It was shown that kinetic curves of phenol consumption expressed as a function of reaction time have 3 segments when immobilized cells were used: phenol adsorption on carrageenan, induction period resulting from the diffusion of substrates through the gel and modification of bacterial cell membrane with phenol and finally the reaction segment; the kinetic curves of free cells have only two periods: induction and synthesis. Induction period is a function of temperature: it decreases with temperature elevation. Figures 8; references 14: 9 Russian, 5 Western.

7813/12947

CSO: 1840/511



UDC [637.12 + 637.1/.3].075

QUANTITATIVE DETERMINATION OF MESOPHILIC AND COLIFORM BACTERIA BY GENERAL  
CEMA STANDARD METHODS FOR FOOD PRODUCTS

Moscow MOLOCHNAYA PROMYSHLENNOST in Russian No 6, Jun 86 pp 41-43

[Article by Ye. Yichinska, Y. Gavlova and Y. Prekopova, Scientific Research  
Institute of Milk Industry, CzSSR (Czechoslovakias)]

[Abstract] Collaboration and exchange of goods within the CEMA system require standardization of analytical methods. Currently an expert commission of CEMA members is developing standards of microbiological analyses of foods including milk products. The quality and sanitary safety of milk is determined by the content of coliform and mesophilic bacteria. The method selected by the commission were tested and compared with standard ISO (MFF) and currently-used Czech methods. Rapidly-spoiling samples were analyzed within 2-3 hrs after collection, stable ones within 3 days. Preparation of various media required for these tests was described. All four of them EKG, MPG, UTGM, and MPL were of comparable quality but EKG--enzyme casein hydrolysate--was recommended for milk testing. For coliform bacteria three media were compared VRBA, DRIG and MPL-BT. VRBA--violet red bile agar--was considered to be the best medium for practical application. References 6: 3 Russian, 3 Western (2 by Czech authors).

7813/12947  
CSO: 1840/1036

UDC 616.006-02:614.47

POSSIBLE MUTAGENIC ACTION OF TULAREMIA VACCINE

Kiev TSITOLOGIYA I GENETIKA in Russian Vol 20, No 3, May-Jun 86 (manuscript received 16 Jan 85) pp 171-174

[Article by V. N. Zilfyan, A. K. Nersesyan, V. A. Kumkumadzhyan and B. S. Fichidzhan, Scientific Research Institute of Roentgenology and Oncology, ArSSR Ministry of Health, Yerevan]

[Abstract] Pathogens of viral and bacterial infectious diseases are capable of damaging human and animal genetic apparatus. Beginning in the 40's, USSR population was immunized prophylactically with dry attenuated live tularemia vaccine (TV). Experiments were performed on rats studying possible mutagenic activity of TV. It was shown that a single subcutaneous injection of 250 and 500 ml of microbial TV virus increased significantly the number of chromosomal aberrations only after two days; after 15 days, this value returned to the control level. A single cutaneous injection of 20 and 15·10<sup>6</sup> cells (i.e., the normally-used doses in human immunizations) did not result in increased levels of cytogenetic damage in myelocardiocytes. Thus the number of microbial cells entering the body through the skin is adequate for the formation of long lasting stress immunity. References 13: 11 Russian, 2 Western.

7813/12947  
CSO: 1840/541

CANCER PROPHYLAXIS AND CELL ADHESION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Feb 87 p 2

[Article by V. Lagovskiy, correspondent]

[Abstract] Findings which could lead to vaccination against many diseases, including cancer have been reported to the State Registry. Participating in this work were the Oncology Science Center and the Scientific Research Institute of Medicinal Preparations (E. Modyanova, A. Molenkov and O. Bocharova) and Leningrad State University (E. Frieman and I. A. Dadivanyan). The principle is based on cell adhesion, whereby defective tissues, subject to diseases, are "protected" by resistant tissues. An agent was isolated which protects animals for their entire life if administered at the proper time in their

bodily development, even though the animals could have been genetically predisposed to such diseases. Animal tests have given positive results. No human data were reported. The problem yet to be resolved is the recognition of cells with impaired stability in man early in life. [Note: An article in Sovetskaya Rossiya 21 Feb 87 p 4 (Abstracted herein) is more informative about this subject.]

7813/12947  
CSO: 1840/522

#### CELL ADHESION AND IMMUNIZATION

Moscow SOVETSKAYA ROSSIYA in Russian 21 Feb 87 p 4

[Article by V. Zenchenko]

[Abstract] An interview with A. G. Malenkov was reported on his work with contactins, substances affecting cell adhesion. His work followed the discovery of Canadian scientist D. Coman that cancer cells do not adhere to each other as well as normal cells do. Concentrating on newborn mice, Malenkov noted that at that stage of cellular organization we could predict individuals with potential future problems, including cancer. Intensified cell adhesion in early stages of the development of any organism is the key to healthy future; weak adhesion forecasts trouble. The contactins may serve as agents which could assist in controlling healthy development of human organisms. To optimize work in this area, concentrated effort (at the ministerial level) is needed including new programs, cooperation between leading research organizations and scientists.

7813/12947  
CSO: 1840/463

#### UNIVERSAL VACCINE AGAINST ARTHROPOD-RELATED VIRUSES

Moscow GUDOK in Russian 4 Feb 87 p 4

[Article by E. Nikolskaya]

[Abstract] A new approach is reported to universal vaccination developed by the scientists associated with the Belorussian Institute of Epidemiology and microbiology. This new vaccination protects against a variety of diseases transmitted by such vectors as ticks; antibodies developed in animals against tick saliva would kill not only ticks but also a variety of disease microorganisms carried by them. Practically, cattle vaccinated against tick saliva would be permitted to graze in areas of high infestation with, for example, encephalitis virus. Immunity due to this vaccination would kill viruses carried by ticks who continue feeding on such cattle. Eventually all viruses would thus be destroyed with these ticks.

7813/12947  
CSO: 1840/462

## CLONES OF LYMPHOBLASTIC RPMI-6410t CELLS REQUIRING EXOGENOUS GROWTH FACTOR

Moscow ONTOGENEZ in Russian Vol 17, No 6, Nov-Dec 86 (manuscript received 13 Mar 86) pp 606-612

[Article by T. M. Seregina and M. I. Mekshenkov, Institute of Developmental Biology imeni N. K. Koltsov, USSR Academy of Sciences, Moscow]

[Abstract] Studies were conducted on the growth requirements of a lymphoblastic cell line designated RPMI-6410t, originally derived from a female patient with acute myeloblastic leukemia. The RPMI-6410t cells were found to produce a growth factor promoting their proliferation, and for which the cells possessed a specific receptor. The limiting dilution technique was employed to derive clones of RPMI-6410t cells incapable of producing the growth factor but requiring it for their growth and survival. The latter cells contained the specific receptor and were capable of proliferation only in media that had been primed by the growth factor-producing parental RPMI-64-10t cells. In addition, the growth factor-nonproducing clone cells failed to form colonies in soft agar. This dependence of the derived clone cells on an exogenous growth factor is a feature characteristic of normal cells that depend on exogenous growth factors. The observations, then, are in accord with the hypothesis that autocrine growth regulation is a characteristic feature of malignancy, while loss of such functional capacity represents a reversion to normalcy. Figures 3; references 19: 2 Russian, 17 Western.

12172/12947

CSO: 1840/527

UDC 612.017.1:579.861.2.097.2

## IMMUNOLOGICAL ACTIVITY OF STAPHYLOCOCCAL PROTEIN A

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 101, No 3, May-Jun 86 pp 449-461

[Article by A. Ye. Vershigora and L. S. Kholodnaya, Kiev State University imeni T. G. Shevchenko]

[Abstract] Among the ingredients of cell wall of greatest interest is somatic surface antigen Staphylococcus aureus--protein A possessing unique ability of nonspecific interaction with immunoglobins. This is a review of literature which covers its synthesis, localization in microbial capsules, chemical composition, antigenic properties and ability to form complexes with immunoglobulin. Protein A was shown to exhibit nitrogenic activity and to stimulate production of interferon. Protein A induces hypersensitivity reactions both immediate and delayed. However, its biological activity has not been adequately studied, especially its in vivo immunobiological activity. References 129: 14 Russian, 115 Western.

7813/12947

CSO: 1840/539

## LYMPHOCYTIC ENZYMES OF ADENOSINE METABOLISM AND SYMPATHOADRENAL FUNCTION IN TUMORIGENESIS

Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 58, No 2, Mar-Apr 86  
(manuscript received 13 Feb 85) pp 45-50

[Article by V. Yu. Umanskiy and Yu. P. Shmalko, Institute of Oncological Problems imeni R. Ye. Kavetskiy, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A study was conducted on the relationship between lymphocytic activities of enzymes involved in adenosine metabolism in the spleen and thymus, and indicators of the functional status of the sympathoadrenal system in C57B1 male mice (25-30 g) injected into a footpad with  $2 \times 10^5$  Lewis carcinoma cells. Within the first 3 days of tumor cell injection the adenosine deaminase activities in splenic and thymic lymphocytes showed a statistically significant increase, in conjunction with slight elevation of 5'-nucleotidase activity in the thymus and a slight depression in the spleen. Concomitantly, hypothalamic levels of norepinephrine decreased by 25%, while the levels of catecholamines in the adrenal medulla increased and the levels of DOPA and dopamine decreased. On day 7 the lymphocytic activities of the enzymes were depressed in both tissues. With the onset of a fulminating metastatic process on day 14 there was a further sharp drop in the activity of adenosine deaminase in both tissues, and a marked increase in the activity of 5'-nucleotidase. In both cases the changes were most dramatic in the splenic lymphocytes. These changes in the enzymatic activities were accompanied by a reduction in the hormonal indicators. Late stages of tumorigenesis (days 21-28) were accompanied by fluctuations of the humoral indicators in the adrenal glands and the hypothalamus and in the enzymes, pointing to an intimate interrelationship between the neuroendocrine and the immune systems in tumorigenesis. References 19: 13 Russian, 6 Western.

12172/12947  
CSO: 1840/499



MARINE MAMMALS

.DC 591.413:599.512

ARTERIAL SYSTEM OF HEAD AND ANTERIOR PORTION OF TRUNK OF BRYDE WHALE  
(BALAENOPTERA EDENI)

Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian, Vol 90, No 5,  
May 86 (manuscript received 23 Jul 85) pp 57-63

[Article by V. V. Melnikov, Laboratory of Bionic Research (Headed by Candidate  
of Biological Sciences A. A. Kuzmin), Pacific Scientific Research Institute of  
Fisheries and Oceanography, Vladivostok]

[Abstract] The arterial system of the head and anterior portion of the trunk  
of the Bryde whale was studied by examination of Bryde whale embryos obtained  
on commercial whaling expeditions in 1974-1977. A photograph, drawing and  
description of the arterial system in the anterior half of the animal are  
presented. Like all previously studied whales, the Bryde whale has a well  
developed complex of arterial rete mirabile, symmetrical placement of the  
branches of the arch of the aorta, with no functional connection between the  
internal carotid artery and the internal cerebral blood supply, the brain  
being supplied through the complex of arterial rete mirabile. The arterial  
system of the whale and its architecture have a great deal in common with  
the arterial systems of whales described earlier. Figures 2, references 14:  
6 Russian, 8 Western.

6508/12947

CSO: 1840/544

UDC 612.015.1:577.152

HYPOGLYCEMIC EFFECTS OF ORAL LIPOSOMALLY ENCAPSULATED INSULIN IN VARIOUS FORMS OF EXPERIMENTAL DIABETES

Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 58, No 2, Mar-Apr 86  
(manuscript received 5 Feb 85) pp 58-64

[Article by A. V. Stefanov, V. K. Lishko, A. V. Shevchenko, A. S. Yefimov and V. V. Khovaka, Kiev Scientific Research Institute of Endocrinology and Metabolism, Ukrainian SSR Ministry of Health; Institute of Biochemistry imeni A. V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Control animals and animals with experimental or genetic diabetes were treated with liposomally-entrapped insulin in order to assess this vehicle in terms of hypoglycemia following oral administration. The experiments were conducted with male and female C57B1/K<sub>s</sub><sup>J</sup>-db<sup>+</sup>/<sup>+</sup>m mice with hereditary diabetes, Wistar rats and rabbits with alloxan-induced diabetes, Wistar rats with streptozocin-induced diabetes, and dogs with total pancreatectomy. Assessment of the dose-effect results in terms of blood sugar demonstrated that per os administration of 30 IU was required for a hypoglycemic effect in control animals, whereas in the diabetic animals a 29-33.3% drop in blood sugar was noted with a 12 IU dose. Depression of blood sugar was correlated with the appearance of immunoreactive insulin in the blood stream. Hypoglycemia persisted over a 6 h period of observation, pointing to the efficacy of liposomally-entrapped insulin in inducing clinically significant hypoglycemia, using a lecithin-cholesterol 9:1 formulation for the liposomes. Figures 2; references 9: 3 Russian, 6 Western.

12172/12947  
CSO: 1840/499

## STABILITY AND ABSORPTION OF LIPOSOMES WITH ENTRAPPED INSULIN IN SMALL INTESTINE

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 2, Mar-Apr 86  
(manuscript received 5 Feb 85) pp 64-69

[Article by A. V. Stafanov, V. K. Kishko, A. V. Shevchenko, A. S. Yefimov and V. V. Khovaka, Kiev Scientific Research Institute of Endocrinology and Metabolism, Ukrainian SSR Ministry of Health; Institute of Biochemistry imeni A. V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Studies were conducted on the stability and absorption of liposomes with entrapped insulin in the gastrointestinal tract, using both in vitro incubation and in vivo technology. Studies with lecithin and lecithin-cholesterol liposomes with 10-50% cholesterol incubated with hydrochloric acid, stomach juice, bile, pepsin or trypsin demonstrated that lecithin liposomes were most susceptible to damage by bile. However, liposomes with 10-50% cholesterol presented with a 3-fold increase in stability on incubation with bile. In addition, in vitro studies were conducted with the injection of the liposomes, with encapsulated insulin, into various ligated sections of the small intestine in control and streptozocin-treated Wistar rats. These studies revealed that the greatest absorption of the liposomes occurred in the upper reaches of the small intestine with the intact liposome, in analogy to chylomicrons, reaching the blood stream. The resultant hypoglycemic effect was correlated with the appearance of immunoreactive insulin peak. Figures 1; tables 3; references 9: 4 Russian, 5 Western.

12172/12947  
CSO: 1840/499

UDC 57.043:616.833-089.843

## CRYOPRESERVATION OF PERIPHERAL NERVES AND EXPERIMENTAL ALLONEUROPLASTY OF NERVE STEM DEFECTS

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 (manuscript received 8 Jul 85)  
pp 11-14

[Article by Yu. B. Chaykovskiy, V. P. Yatsenko, G. I. Kogut and S. P. Galich, Kiev State Institute for the Advanced Training of Physicians]

[Abstract] Dogs were employed in a study on the effects of the method of cryopreservation of nerve segments on subsequent success of alloneuroplasty. The situation in which donar dogs received an injection via the abdominal aorta of a cooled preservative mixture into the sciatic nerve, with preservation at  $-196^{\circ}\text{C}$  for 3-4 months, provided superior results. The donors were injected with a solution at  $4^{\circ}\text{C}$  consisting of dimethyl sulfoxide (100 g), glucose (50 g), hydrocortisone (60 mg) and insulin (60 U) in 1000 ml of

physiological saline. The resected segment was then stored at 4°C for 1 h in a medium containing glycerol (150 g), serum (150 ml), glucose (50 g), hydrocortisone (60 mg), insulin (60 U) and medium 199 to 1000 ml, and then frozen at -196°C. Grafting of the rapidly-thawed nerve segments into 5-6 cm defects in the sciatic nerve in recipient dogs revealed a ca. 71% viability of neurolemmocytes in the grafts, which facilitated nerve regeneration. Complete regeneration of the stump defect was noted 3-6 months after alloplasty. Figures 2; references 4: 3 Russian, 1 Western.

12172/12947  
CSO: 1840/536

UDC 57.043:612.111.014.41

#### SEROLOGICAL CHARACTERISTICS OF CRYOPRESERVED ERYTHROCYTES

Kiev KRIBIOLOGIYA in Russian No 1, Jan-Mar 86 (manuscript received 17 May 85)  
pp 50-51

[Article by Yu. V. Kononov and T. G. Fedorova, Kharkov Oblast Blood Transfusion Station, Ukrainian SSR Ministry of Health]

[Abstract] Donor blood was used in studies on the effects of cryopreservatives on erythrocyte agglutination in blood group testing. The serological data demonstrated that mixing with the cryopreservatives glycerol, 1,2-propylene glycol or polyethylene oxide (15,000 MW) and storage at -196°C in these agents for 1 to 12 months had no effect on detection of A and B antigens. However, in some cases the results became negative or equivocal in determination of rhesus antigens after storage or exposure to glycerol and 1,2-propylene glycol. M and N titers diminished by one dilution tube on preservation or mixing with glycerol or 1,2-propylene glycol. These findings indicate that careful blood group determinations must be performed on blood at the time of collection, particularly if long-term storage is anticipated. This requirement is particularly applicable to Rh and MNS<sub>s</sub> serologies.

12172/12947  
CSO: 1840/534

#### PACEMAKER THERAPY

Baku BAKINSKIY RABOCHIY in Russian 10 Jan 87 p 4

[Article by E. Aliyev, Surgeon at Scientific Research Institute of Clinical and Experimental Surgery imeni M. Topchibayev]

[Abstract] In the last two decades the author's institute has introduced surgical intervention and cardiostimulator implantation heart arrhythmia. The newest pacemaker models are adjustable and can control both high and low pulse rate, avoiding continuous use of drugs and frequent calls for the

ambulance service. This is a highly-effective instrument thanks to which many patients, potential invalids, return to useful work and life. In recent years, attention has been given to surgical treatment of tachycardia and arrhythmia; a special department has been organized with newest equipment and assistance from ambulance and air-evac service.

7813/12947

CSO: 1840/518

#### SCALPEL-FREE SURGERY

Moscow VECHERNAYA MOSKVA in Russian 19 Feb 87 p 2

[Article by B. Samoylov]

[Abstract] Surgical scalpels are being replaced by modern tools of therapy. Intravascular catheterization for correction of arterial canal in congenital heart defect is reported in this article. In the past, open heart surgery was required to seal this defect. Presently, a catheter is inserted into femoral vein, passed through the heart to the affected area and a special polymer seal with metallic hooks is passed through, attaching itself to the aorta walls and sealing the defect. This "surgery" lasts about one hour. Physical and physiological trauma to the patient is minimized and the recovery time is cut down drastically. Already 167 patients in the department of pediatrics have been treated successfully.

7813/12947

CSO: 1840/519



ALKALOID PRODUCTION BY *PENICILLIUM SIZOVAE*

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 22, No 2, Mar-Apr 86 (manuscript received 12 Mar 84) pp 205-210

[Article by A. G. Kozlovskiy, I. G. Vepritskaya and N. B. Gayazova, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino]

[Abstract] An analysis was conducted on the production of agroclavine-I (I) and epoxyagroclavine-I (II) by *Penicillium sizovae* cultures, which revealed two production peaks separated by a small lag phase on a mineral medium, pH 5.2. For the first 5 days alkaloid accumulation proceeds in parallel with biomass increase, with a I:II ratio of 1.5:1. Maximum alkaloid accumulation in the medium occurs in the stationary phase of growth, concomitantly with an inversion in the I:II ratio to 1:6. After 10 days essentially only II is produced. Analysis of carbon source utilization showed that initially succinic acid was utilized during the first 8-9 days of growth, with a switch to mannitol utilization commencing on days 5-6. Replacement of mannitol by glucose led to greater biomass production and diminished biosynthesis of the alkaloids. Only 50% of the available phosphate was utilized by days 5-6, with alkaloid synthesis continuing in the presence of high phosphate concentrations in the medium. Figures 4; references 15: 4 Russian, 11 Western.

12172/12947  
CSO: 1840/548

## EFFECTS OF pH ON SUSCEPTIBILITY OF THIOBACILLUS FERROOXIDANS TO SELECTED IONS

Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 22, No 2, Mar-Apr 86 (manuscript received 30 Jan 84) pp 259-265

[Article by T. V. Kovalenko and T. Ye. Dudareva, Central Scientific Research Institute of Geological Prospecting, Department of Experimental Research, Tula]

[Abstract] The effects of a series of anions and cations on the oxidation of  $\text{Fe}^{2+}$  by Thiobacillus ferrooxidans were evaluated in relation to pH. At pH 1.5-1.6 the inhibitory effects of  $\text{AsO}_2^-$ ,  $\text{AsO}_3^{3-}$ ,  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$  and  $\text{Fe}^{3+}$  were far less pronounced than at pH 1.9-2.2. However, at the lower values of pH biomass accumulation was also diminished, a fact that also entailed diminished  $\text{Fe}^{2+}$  oxidation. The economic coefficient of T. ferrooxidans was highly pH-dependent, varied with the different phases of the growth curve, and generally was at a maximum in the mid-portion of the exponential growth phase. The adverse effects of high  $\text{H}^+$  concentration on  $\text{Fe}^{2+}$  oxidation were shown to be mitigated by  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Fe}^{3+}$  and  $\text{AsO}_2^-$ . In addition,  $\text{AsO}_2^-$ ,  $\text{AsO}_4^{3-}$ ,  $\text{Zn}^{2+}$ ,  $\text{Ni}^{2+}$  and  $\text{Cu}^{2+}$  were observed to enhance oxidation but not growth of T. ferrooxidans under less than optimal growth conditions. Figures 5; references 14: 5 Russian, 9 Western.

12172/12947  
CSO: 1840/548

UDC 579.64.631.46

## EFFECT OF PHYTOTOXIC GLYCOLIPIDS ON NITROGENASE ACTIVITY AND ULTRASTRUCTURE OF LUPIN NODULES

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 48, No 4, Jul-Aug 86 (manuscript received 10 Apr 85) pp 8-15

[Article by Ye. V. Nadkernichnaya, V. V. Kolibaba, A. Ye. Mamchur and N. M. Zaritskiy, Ukrainian Scientific Research Institute of Agricultural Microbiology, Chernigov]

[Abstract] Chromatographically pure material was isolated from culture medium of saprotrophic soil fungus Chaetium aureum and classified as a glycolipid. While showing no antibiotic activity at low concentrations, it depressed nitrogen-fixating activity of lupin nodules. To determine the reason for this, ultrastructure of these nodules was studied under normal conditions and after exposure to phytotoxin, showing that this phytotoxic material induced earlier aging of lupin nodule cells, altered the physiology

of nodule bacteria preventing them from being converted to bacteroids. This evidently explains inhibition of nitrogenase activity of nodules under the effect of the phytotoxin studied. Figures 10; references 7 (Russian).

7813/12947  
CSO: 1840/531

UDC 57.043

#### CASSETTE SYSTEM FOR PRESERVATION OF MICROORGANISMS IN LIQUID NITROGEN KhB-0.5 FREEZERS

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 pp 42-43

[Article by T. M. Sidyakina, A. I. Tarakanchikov and M. Yu. Chumakova, All-Union Collection of Microorganisms, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Moscow]

[Abstract] The liquid nitrogen freezer KhB-0.5 has been modified to allow a cassette approach to the storage of frozen cultures of microorganisms. A stainless-steel spiral holder has been designed to hold a series of 2 ml ampules (glass or plastic). The holders are then placed into triangular racks that fit into the KhB-0.5 for storage. This method allows for the accommodation of 11,070 ampules in KhB-0.5, and represents greater efficiency in the utilization of the storage capacity. Figures 3.

12172/12947  
CSO: 1840/536

UDC 691.32:620.19(07)

#### VIABILITY OF MICROORGANISMS IN CONCRETE PORES

Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian, Vol 22, No 6, Nov-Dec 86 (manuscript received 21 Jun 84) pp 844-849

[Article by G. Ya. Drozd, Makeyev Engineering-Construction Institute]

[Abstract] A study is presented of the viability of microorganisms in concrete pores. Cubes of fine grained concrete with edge length 7 cm were made of sterilized quartz sand containing 0.02 mm glass capillaries. The specimens were then placed in a sewer treatment plant aeration tank containing communities of various bacteria including the genera *Alkaligenes*, *Achromobacter*, *Pseudomonas*, *Corynebacterium*, plus fungi, algae and protozoans, total microorganisms biomass 2 g/l. The specimens were analyzed for content of microorganisms after 1, 3, 6 and 12 months. Microscopic examination showed that microorganisms growing in the concrete pores consisted of 80% spherical cell forms, 10% straight and bent rods and 10% mycelial, distributed quite unevenly over the surface of the capillaries, with a tendency toward formation of

accumulations at the edges of the capillaries. Changes in the composition of gas in the glass capillary cavities indicated that the cells were viable in the pore space rather than being carried in by diffusing water and dying. Ammonifying organisms and silicate bacteria predominated. The chemical composition of the viscous components of the concrete had no significant inhibiting influence on the microorganisms. Adaptation of the cells to conditions in the pores was accompanied by selection of microorganisms and resulted in the formation of a biocenosis resistant to extreme conditions. The oxygen deficit in the pores of the concrete resulted in the appearance of anaerobic species of microorganisms. Organic matter diffusing into the pores served as the energy source. Figures 4; references 11: 10 Russian, 1 Western.

6508/12947  
CSO: 1840/552

UDC 579.84:620.193.8

#### INFLUENCE OF CATHODIC POLARIZATION OF METAL ON BIOLOGICAL AND CORROSION ACTIVITY OF SULFATE-REDUCING BACTERIA

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian, No 1, Jan 87 (manuscript received 25 Aug 86) pp 63-66

[Article by Ye. I. Andreyuk, corresponding member, UkSSR Academy of Sciences, N. S. Antonovskaya, A. I. Pilyashenko-Novokhatnyy, A. I. Lysaya and I. A. Kozlova, Institute of Microbiology and Virology, UkSSR Academy of Sciences, Kiev]

[Abstract] A study was made of the cause of the reduction in effectiveness of cathode protection of metals from corrosion in the presence of sulfate-reducing bacteria and the influence of cathodic polarization on the activity of these microorganisms under laboratory conditions. Studies were performed on specimens of low-carbon steel cathodically polarized from -0.88 to -1.48 V over a period of 10 hours. The metal specimens were placed in an electrochemical cell containing an actively reproducing culture of *Desulfovibrio desulfuricans* isolated from metal corrosion products. Cathodic polarization caused the biological activity of the sulfate-reducing bacteria to increase. Hydrogenase activity began to increase at minimum protective potential. At -0.88, -0.98 and -1.08 V, hydrogenase activity was more than 3 times greater than for cathodically unprotected metal. Maximum hydrogenase activity was observed at -1.38 V. The data thus indicate a complex interaction of microbiological and electrochemical processes, although cathodically-polarized metal did corrode more slowly than unprotected metal. Figures 2, references 8: 6 Russian, 2 Western.

6508/12947  
CSO: 1840/487

RESTRICTION ANALYSIS OF PLASMID pSG1912

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 48, No 2, Mar-Apr 86 (manuscript received 29 Apr 85) pp 79-80

[Article by Ye.Ye. Stefanishin, T.D. Dekhtyarenko, L.V. Polishchuk, V.B. Zaverukha and B.P. Matselyukh, Institute of Microbiology and Virology, Ukrainian SSR Academy of Sciences, Kiev]

[Text] Streptomycete plasmids are of considerable theoretical and practical interest, since they are used as vectors in cloning antibiotic and cytodifferentiation genes. Plasmid DNA has been detected in many varieties of streptomycetes. However, only a limited number of plasmids have been used in cloning streptomycete genes. Among the plasmids used for that purpose the predominant position is held by SCP2\*, SLPl.2 and pIJ101, that have been isolated from *Streptomyces coelicolor* A(3)2, *S. lividans* 66 and *S. lividans* ISP5453, respectively.

The narrow host spectrum for many streptomycete plasmids has necessitated the development of vector-host systems for each streptomycete group.

We had previously conducted screening on plasmids of the globinosporine streptomycetes. *Streptomyces* sp. 12 was found to have a plasmid DNA that, apparently, controls the synthesis of an undefined antibiotic inhibiting the growth of individual streptomycete strains [1]. The present study is concerned with an electron microscopic analysis of plasmid pSG1912 DNA and its cleavage by a number of restrictases.

Electron microscopy has shown the molecular weight of pSG1912 to be 6.21 Mdaltons, using plasmid pBR322 DNA as the standard [4] (Fig. 1). This value is in agreement with the linear molecular weight of the pSG1912 DNA molecule, as well as with the total molecular weight of the fragments obtained after endonuclease treatment and electrophoretic separation in agarose gel. Here, standard molecular weights were provided by HindIII fragments of phage lambda DNA (Table 1). Several bands of plasmid DNA were detected in preparations obtained by CsCl-ethidium bromide density gradient centrifugation [3] (Fig. 2, 8). Isolation of the individual bands from the agarose gel and their analysis by restrictases demonstrated



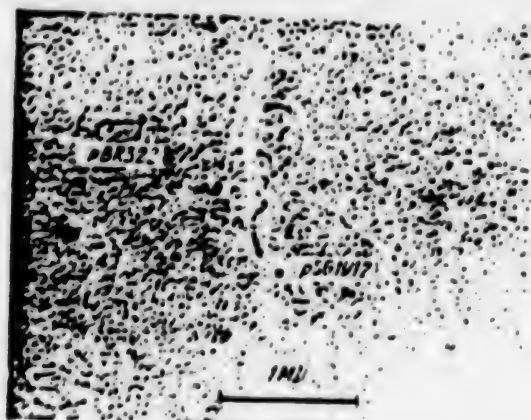


Figure 1. Electron Microphotography of Plasmids pSG1912 and pBR322



Figure 2. Agarose Gel Electrophoresis of Restrictase Fragments of Plasmid pSG1912: 1 -- BamHI, 2 -- PvuII, 3 -- BamHI + PvuII, 4 -- KpnI, 5 -- AluI, 6 -- SmaI, 7 -- BglII, 8 -- pSG1912, 9 --  $\lambda$  + HindIII, 10 -- KpnI + BamHI, 11 -- KpnI + PvuII

Table 1. Molecular Weight of pSG1912 DNA Fragments After Restrictase Treatment

(1) Фрагмент	(2) Величина фрагмента $\times 10^6$	(3) % от нативной плазмидной ДНК	(1) Фрагмент	(2) Величина фрагмента $\times 10^6$	(3) % от нативной плазмидной ДНК
BamHI	6.21	100	KpnI+BamHI	2.84	45.7
PvuII	6.21	100		1.86	29.95
KpnI	4.26	68.6		1.42	22.86
	1.95	31.4	KpnI+PvuII	2.84	45.7
BamHI+PvuII	6.21	100		1.86	29.95
				1.5	24.15

Key:

1. Fragment
2. Fragment size  $\times 10^6$
3. % of native plasmid DNA

that the different bands represented various forms of the DNA, e.g., open, linear, and supercoiled.

For restriction analysis we employed the following restriction endonucleases:

BamHI, PvuII, KpnI, AluI, SmaI and BgIII ("Ferment" Scientific Industrial Association, Vilnius). The restriction reactions were carried out in standard buffer systems used with these enzymes.

The data revealed that pSG1912 DNA did not possess sites for BgIII (Fig. 2, 7), nor for EcoRI or HindIII. Restrictases BamHI and PvuII transform the open and the supercoiled forms of the plasmid DNA into the linear form, i.e., each recognizes one restriction site (Fig. 2, 1, 2). Restrictase KpnI cleaves the pSG1912 molecule into two fragments with molecular weights of 4.26 and 1.95 Mdaltons (Fig. 2, 4).

Double digestion with the BamHI + PvuII combination had virtually no effect on the molecular weight of the linear form of pSG1912 DNA (Fig. 2, 3). The electrophoretic patterns for double cleavage of the plasmid DNA with the KpnI + BamII and KpnI + PvuII combinations were analogous (Fig. 2, 10, 11). This fact indicated that the BamHI and PvuII sites are located one after another on the restriction map of pSG1912. The data on the molecular weights of the fragments obtained as a result of treatment with the KpnI + PvuII and KpnI + BamHI combination indicated that the Bam HI and the PvuII sites are located in a serial fashion on the larger KpnI fragment.

Studies on restrictase analysis of pSG1912 DNA are being continued.

The plasmid isolated by us has been shown to have a low molecular weight and unique restriction sites, and thus may be suitable for the construction of vectors for the globosporin group of streptomycetes.

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12172/12947

CSO: 1840/529

INSERTION OF COS SITE INTO PHAGE M13 DNA AND ITS PACKAGING WITHIN PHAGE  
LAMBDA CAPSID

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 8, Aug 86 (manuscript  
received 25 Feb 86) pp 1135-1138

[Article by Ye. R. Zabarovskiy, D. G. Demirov, M. K. Nurbekov and L. L.  
Kiselev, Institute of Molecular Biology, USSR Academy of Sciences, Moscow]

[Abstract] In order to design an efficient method of kilosequencing, a  
hybrid vector designated as MC18 was created by inserting the cos from pHC79  
cosmid into the DNA of phage M13 mp18. The recombinant MC18 was then effi-  
ciently packaged into lambda capsid, and the latter used for molecular cloning  
of BamHI-EcoRI fragment of plasmid pGP588 (containing nucleotide sequence  
homologous to that of oncogene mos and Moloney retrovirus). The efficiency  
of transfection of *E. coli* JM109 was on the order of  $10^5$  to  $10^6$  pfu/ $\mu$ g vector  
DNA. These observations suggest that such MC vectors may serve as useful  
vehicles for cloning and sequencing large nucleotide fragments with cohesive  
or blunt ends. Figures 2; references 10: 3 Russian, 7 Western.

12172/12947

CSO: 1840/443

UDC 617-001.17-008.9:615.356

REGULATION OF PROTEOLYSIS AND ERYTHROCYTE PEROXIDATION HEMOLYSIS IN  
EXPERIMENTAL BURNS WITH ANTIOXIDANT KARBATON

Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 58, No 3, May-Jun 86  
(manuscript received 20 May 85) pp 78-80

[Article by G. G. Shershun, O. F. Bagan, A. A. Kiyashko, I. N. Butvin and  
L. M. Rubina, Ternopol Medical Institute]

[Abstract] Therapeutic trials were conducted with the antioxidant karbaton in controlling serum and tissue proteolytic activity and red cell peroxidation hemolysis in guinea pigs subjected to burns. The animals sustained burns over 15-20% of body surface from 98-100°C steam for 50-60 sec. Following the thermal challenge, the animals were maintained either on 50 or 100 mg/kg karbaton every 24 h. Animals with experimental burns responded with an immediate increase in activity of proteolytic activity of the serum, heart and kidneys on the order of 1.5- to 2-fold. Peroxidation resistance of erythrocytes diminished by 56%. However, the proteolytic activity in the liver remained unaffected by the trauma. In the septicotoxemic stage proteolytic activity of the myocardium and the kidneys increased by 180 and 191%, respectively, and peroxidation resistance of the erythrocytes fell to 96% of the control level. Karbaton in a dose of 50 mg/kg attenuated proteolysis, without affecting erythrocyte susceptibility to peroxidation. In septicotoxemia this dose was ineffective. Optimal therapeutic results were obtained with 100 mg/kg karbaton, which reduced by 40-70% proteolysis in the serum and tissues. On these grounds, karbaton was deemed an effective agent in correcting metabolic perturbations attendant to burns. Tables 1; references 16: 15 Russian, 1 Western.

12172/12947  
CSO: 1840/500

## CYCLIC ANGIOTENSIN ANALOGS WITH HYPOTENSIVE AND HISTAMINE-RELEASING ACTIVITIES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 8, Aug 86 (manuscript received 17 Feb 86) pp 1118-1120

[Article by Yu. Ye. Antsans, D.A. Biseniyetse, N. V. Myshlyakova, Ye. A. Porunkovich, M. P. Ratkevich, G. A. Afanasyeva, G. G. Kublis, A. A. Skuinsh, G. Ya. Zalitis and G. I. Chipens, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] Ten cyclic analogs of angiotensin (AT) were synthesized and possessed unexpected hypotensive and histamine-releasing effects. The hypotensive effects, observed in rats, were dose-related, showing a 35-50 mm Hg drop lasting for up to 2 h or longer. The analogs did not react with AT receptors, as evidenced by the lack of competitive inhibition. In vitro studies, with rat peritoneal mast cells, revealed that these peptides were 2- to 3-fold as potent in inducing histamine release as compound 40/80. The linear analogs were without such properties, indicating that the ring structure predisposed to the pronounced hypotensive and histamine-releasing physiological actions. The two most potent hypotensives were cyclo(lys-val-tyr-ile-his-pro-phe-arg-) and cyclo(lys-ala-val-tyr-ile-his-pro-phe-arg-). Figures 1; references 7: 1 Russian, 6 Western.

12172/12947

CSO: 1840/443

UDC 611-018.1

## ELECTRONMICROSCOPIC STUDY OF MUSCLE TISSUE CELLS EXPOSED TO ACTION OF STAPHYLOCOCCAL TOXIN ON BACKGROUND OF GENERAL HYPERTHERMIA

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 123, No 2, Aug 86 (manuscript received 28 Jun 84) pp 413-415

[Article by G. K. Gogichadze and N. N. Kacharava, Scientific Research Institute of Hematology and Blood Transfusion imeni G. M. Mukhadze, GSSR Ministry of Health]

[Abstract] Electronmicroscopic study of muscle tissue was carried out on white rats under conditions of general hyperthermia coupled with exposure to staphylococcal toxin (from *Staphylococcus O<sub>15</sub>*). The rats were kept daily for one hour at 30-40°C; staphylococcal toxin was injected on day 15. Samples were collected on days 1, 5, 7, 14, 21 and 30. It was shown that starting with the 5th post-injection day, destructive changes were observed in myofibrillae and in myocytes. Figures 2; references 3 (Russian).

7813/12947

CSO: 1840/1038



## EFFECT OF CHOLINE AND CHOLINESTERASE ANTAGONISTS ON LEARNING PROCESS AND LOCAL CEREBRAL BLOOD FLOW DYNAMICS IN RATS

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 123, No 2, Aug 86 (manuscript received 27 Sep 84) pp 389-392

[Article by T. E. Adamiya, Institute of Physiology imeni I. S. Beritashvili, GSSR Academy of Sciences]

[Abstract] It was shown earlier that the process of searching for optimal movement through a labyrinth is always accompanied by increased local cerebral blood flow (LCBF). Intraperitoneal injection of scopolamine affected learning process and lowered LCBF; about 20 min after injection of scopolamine, it led to narrowing of pial arteries (PA). Developing a time-restricted model for blocking choline structures, the authors utilized the antagonism between anticholine and anticholinesterase agents by supplanting scopolamine injection with injection of galantamine (5 mg/kg) or eserine (1 mg/kg). These agents fully reconstituted the effect of LCBF elevation and learning ability; the crosssection of PA returned to normal. It was shown, thus, that the neurogenic link in the regulating mechanism of LCBF plays an important role. Figures 2; references 9: 4 Russian, 5 Western (1 by Russian authors).

7813/12947

CSO: 1840/1038

UDC 577.352.5:[615.224+547.827]

## EFFECT OF NICARDIPINE AND RIODIPINE ON CALCIUM CURRENT IN FROG ATRIUM TRABECULAE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian, Vol 3, No 11, Nov 86 (manuscript received 29 Apr 86) pp 1144-1147

[Article by V. N. Ponomarev and E. V. Narushyavichyus, Scientific Research Institute of Physiology and Pathology of the Cardiovascular System, Lithuanian SSR Ministry of Health, Kaunas; G. Ya. Dubur and A. Kh. Velen, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] A study was made of the blocking of the  $Ca^{2+}$  channel in the cardiac muscle by verapamil and its derivative D-600, showing that it is frequency dependent and potential-dependent. This article studies the variation of blocking and deblocking of the calcium channel of the cardiac muscle as a function of frequency of stimulation and membrane potential upon exposure to other calcium antagonists--derivatives of 1, 4-dihydropyridine: the hypotensive preparation riodipine and the vasodilator nicardipine. Ion current were recorded on isolated frog atrium trabeculae in a perfusion chamber with double saccharose bridge. The results indicate that the process of blocking by nicardipine depends on the status of the calcium channel. When the

channel is closed, there is no blocking. Additional experiments will be required to determine whether nicardipine blocks the channel in the open or inactivated state. Riodipine blocks the calcium channel even when depolarizing stimulation is absent, i.e., the channel is closed. Figures 2; references 8: 2 Russian, 6 Western.

6508/12947

CSO: 1840/485

## PHYSIOLOGY

UDC 547.963.4

### EFFECTS OF THYROXINE ON AFFINITY OF HEMOGLOBIN FOR OXYGEN AND 2,3-DIPHOSPHOGLYCERATE CONCENTRATION IN RAT ERYTHROCYTES

Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 58, No 2, Mar-Apr 86  
(manuscript received 12 Dec 84) pp 84-86

[Article by B. F. Sukhomlinov, G. L. Antonyak and A. V. Trikulenko, Lvov University imeni I. Franko]

[Abstract] To further define the role of thyroxine in the affinity of hemoglobin for oxygen and its relation to 2,3-diphosphoglycerate levels in erythrocytes, outbred rats (120-140 g) were injected with 0.4 mg/100 g thyroxine at 24 h intervals for 5 days. After the 6th day the oxyhemoglobin dissociation curve showed a shift to the right, increasing with the cumulative thyroxine dose. Concomitantly, the concentration of 2,3-diphosphoglycerate increased from a baseline level of  $3.97 \pm 0.13$   $\mu$ moles/ml to  $5.82 \pm 0.53$   $\mu$ moles/ml ( $P < 0.05$ ). The effects on the affinity of hemoglobin for oxygen were attributed to the thyroxine-induced increase in the erythrocyte level of 2,3-diphosphoglycerate, suggesting that thyroxine may be an effective antihypoxic agent. Figures 1; tables 1; references 17: 3 Russian, 14 Western.

12172/12947  
CSO: 1840/499

UDC 612.82:615.357:613.863.001.6

### NEUROENDOCRINE MECHANISMS OF EMOTIONAL STRESS

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 102, No 1(4), Jul-Aug 86  
pp 97-108

[Article by M. G. Amiragova and M. I. Arkhangelskaya, Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] This article reviews the world literature on neuroendocrine mechanisms of emotional stress compensation. Stress first activates the

central nervous system. All endocrine and autonomic reactions which arise in response to stress are secondary, resulting from changes in the functional status of the CNS. The posterior segment of the hypothalamus has been found to be a necessary link in the transmission of influences of the midbrain reticular formation to specific hypothalamus-hypophysis hormonal secretion mechanisms. The posterior hypothalamus appears to have a pacemaker role in the formation of hormonal reactions, with the reticular neurons of the posterior hypothalamus acting to stimulate hormonal secretion. These neurons receive information on the internal environment of the body through non-specific neuronal elements, activating hypothalamic regulation of hormonal secretion, increasing the level of hormones in the blood in accordance with the demands of the body in any situation. The high level of hormones in the blood maintains excitation in brain formations. Classical mechanisms of negative feedback are ineffective in this situation and the hormone level in the blood remains high for some time even after stress is relieved. References 104: 68 Russian, 36 Western.

6508/12947  
CSO: 1840/540

UDC 612.822.1:812.57

#### HOMOCARNOSINE CONTENT DURING MULTIPLE HYPOTHERMIA AND HIBERNATION

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 5, Sep-Oct 86  
(manuscript received 22 Jan 86) pp 72-75

[Article by Kim En Ryul and E. Z. Emirbekov, Dagestan Institute imeni V. I. Lenin Makhachkala]

[Abstract] Considering the neurospecific role of GAMA-containing dipeptide homocarnosine, its quantitative content was determined in various segments of the brain during adaptation to artificial cooling of the test animals and during hibernation. Experiments were performed on rats and gophers. The content of homocarnosine in cerebral hemispheres, in midbrain, diencephalon and in cerebellum was lowered drastically as a result of cooling. With 4-7 repeated hypothermias, the level of homocarnosine lowered by this repeated cooling did not return to normal during the warming period. After 11-12 courses, an adaptation was observed, homocarnosine level returning to normal during the warming period. During hibernation (1, 7 and 30 days long) homocarnosine is either retained at control levels or even becomes elevated in all brain segments. References 14: 13 Russian (1 by Western author), 1 Western.

7813/12947  
CSO: 1840/502

# REINFUSION OF AUTOLOGOUS BLOOD IRRADIATED BY ULTRAVIOLET LIGHT; EFFECT ON RABBIT BLOOD VISCOSITY

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: BIOLOGIYA in Russian No 2, May 86 (manuscript received 3 Oct 85) pp 64-69

[Article by A. G. Golubev and A. B. Bashkirov]

[Abstract] Experiments performed on 48 Chinchilla rabbits (male and female) involved drawing 5 ml of blood from one ear into a test-tube with an anti-coagulant (3.8 percent solution of sodium citrate) and injection of it into the other ear. The blood was irradiated with constant mixing at  $25.0 \pm 0.5^\circ\text{C}$  under a Q-139 erythema lamp at a distance of 16 cm with a 10 cm area of irradiated surface. Rabbits receiving the same treatment except irradiation of the blood served as the control group. About 3 ml of blood drawn before reinfusion and 10-20 minutes after reinfusion were used to determine relative viscosity of the blood and the hematocrit. Reinfusion of non-irradiated blood produced no change in the blood but reinfusion of irradiated blood reduced the viscosity by 10-20 percent within 15-30 minutes after reinfusion in 11 of 23 cases. Increase of viscosity did not occur in the experimental or the control tests. The amount of blood viscosity decrease correlated with the initial hematocrit and with the initial ratio of blood viscosity to hematocrit. Results were discussed in relation to the possible role of lipid peroxidation products, especially eicosanoids, in control of blood viscosity. One of the promising areas in the study of physiological mechanisms which control blood viscosity is the effect of arachidonic acid metabolism in the vascular wall and in blood cells. Reinfusion of autologous blood, irradiated by ultraviolet light, appears to be a simple means of modifying these processes. Figures 5: references 12: 8 Russian, 4 Western.

2791/12947

CSO: 1840/415

UDC 577.123+591.481.1+591.543.42

# BRAIN SYNTHESIS OF RNA IN HIBERNATING ANIMALS

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 (manuscript received 12 May 83) pp 20-22

[Article by R. Ya. Gordon, L. S. Bocharova and V. I. Arkhipov, Institute of Biophysics, USSR Academy of Sciences, Pushchino]

[Abstract] Incorporation of  $^3\text{H}$ -uridine into RNA was used as the parameter used to evaluate RNA synthesis in the brains of hibernating ground squirrels (*Citellus suslicus*), as well as animals waking from hibernation. In the hibernating animals the activity of the nucleotide pool was two-fold lower than in control wakeful ground squirrels, while the rate of RNA synthesis



was ten-fold lower. Two hours after waking, the nucleotide pool showed no significant increase, but the rate of RNA synthesis increased six-fold. These observations demonstrated the dependence of the rate of RNA synthesis in the brain on general activation of CNS in hibernating ground squirrels. References 4: 3 Russian, 1 Western.

12172/12947  
CSO: 1840/536

UDC 612.112.93:612.014.461.3:616-089.583.29-092.4/.9

EFFECTS OF DERMAL BASOPHILS ON CUTANEOUS CAPILLARIES AND WATER BALANCE IN ALBINO RATS SUBJECTED TO EXTREME HYPOTHERMIA AND IN POSTHYPOTHERMIC PERIOD

Kiev KRIOBIOLOGIYA in Russian No 3, Jul-Sep 86 (manuscript received 25 Oct 85) pp 25-29

[Article by O. D. Myadelets and A. F. Sukhanov, Vitebsk Medical Institute]

[Abstract] Studies were conducted on albino rats on the relationship between dermal basophils, capillary density in the skin, capillary alkaline phosphomonoesterase activity, and cutaneous water content in deep hypothermia (18°C rectal temperature for 10 min). The study was conducted with male and female rats in three age categories: young, mature, old. In the young animals hypothermia was accompanied by marked depletion of basophils that persisted for 3 days, then recovery to above-baseline levels. Basophil serotonin levels were depressed for 3 days. Water content of the skin was not affected, while capillary density increased during the hypothermic session, with rapid subsequent recovery. In addition, capillary alkaline phosphomonoesterase activity remained unaffected by hypothermia. In the adult animals the changes were basically similar, with a much slower recovery. However, in this age group cutaneous water content was significantly elevated by hypothermia, requiring 7 days for normalization, while the enzyme activity showed pronounced depression that persisted for 7 days. In the old animals, the changes were less pronounced than in the young group, showing more rapid recovery of baseline values. However, in the latter group, capillary density increased with hypothermia, as did the water content, with both parameters showing rapid recovery. Changes in alkaline phosphomonoesterase followed a similar pattern. These observations demonstrated that basophils had an impact on hemodynamics and water balance in the skin, and that age factors affected dermal basophil status. References 10 (Russian).

12172/12947  
CSO: 1840/536

## BIOLOGY AND CRYOBIOLOGY OF REVERSIBLE CESSATION OF VITAL FUNCTIONS: REGULATION AND FUNCTIONAL METABOLISM

Kiev KRIOBIOLOGIYA in Russian No 1, Jan-Mar 86 (manuscript received 10 Sep 85)  
pp 5-11

[Article by A. M. Utevskiy, Institute of Problems in Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] Although as commonly interpreted the Arrhenius equation may be taken as evidence for the fact that at the temperature of absolute zero all chemical transformations or reactions cease, selected phenomena have been identified--such as free radical formation and tunnelling processes--that are actually stimulated at very low temperatures. These arguments are advanced to substantiate the view that similar, perhaps programmed, events occur in biological systems and are responsible for low-temperature preservation and recovery of vital functions. Under less severe conditions manifestations of the persistence of a baseline biological survival mechanism are to be found in hibernation and estivation. A hypothesis of functional metabolism is advanced as a self-regulating and self-renewing system integrating regulatory and structural components of metabolism as the primary level at which life is maintained at the molecular level. Figures 1; references 7: 1 Ukrainian, 6 Russian.

12172/12947  
CSO: 1840/534

## ELECTROPHYSIOLOGICAL CORRELATES OF HEART FUNCTION IN GROUND SQUIRRELS (CYTELLUS UNDULATUS) WAKING FROM HIBERNATION

Kiev KRIOBIOLOGIYA in Russian No 1, Jan-Mar 86 (manuscript received 5 Oct 84)  
pp 31-34

[Article by G. F. Zhegunov, Institute of Problems in Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] A study was conducted on the electrophysiological correlates of myocardial function of ground squirrels (*Cytellus undulatus*) in relation to changes in their body temperature as they wake from hibernation. Analysis of the EKG patterns demonstrated that, as the body temperature began to rise in the 2-10°C range, depolarization and repolarization of the myocyte membranes accelerated, and the rate of electrical impulse conduction in the heart conducting system increased. At 10°C, the heart cycle decreased to 0.38 sec, a 13-fold decrease from the duration at 2°C. These changes are most pronounced in the time interval (2.5 h) required for the transition of body temperature from 2°C to 10°C. The 1-3 h transition from 10°C to a body temperature of

36°C is accompanied by less-pronounced, but similar, changes in the EKG. It is evident that the myocardium of the heterothermic animals is capable of drastically altering its metabolism in a short interval of time, a phenomenon that requires more detailed molecular studies. Figures 5; references 7: 4 Russian, 3 Western.

12172/12947

CSO: 1840/534

BRIEFS

RADIOIMMUNOLOGICAL ANALYSIS LAB IN TURKMEN SSR--10 Dec--A radioimmunological analysis laboratory was set up in the facilities of the center for radio-isotope diagnostics at the Scientific Research Institute of Oncology in the Turkmen Soviet Socialist Republic. A patient's disease may be accurately diagnosed by merely taking his or her blood count, from which hormone concentration and tumoral markers are determined using special sera from commercial sets manufactured in the Soviet Union, France and West Germany. Thanks to a research complex where hormonal profile plays the most important role, lab specialists--Candidates of Medical Sciences L. Arutyunov and N. Samedov and senior scientific assistant S. N. Pavlichuk--can diagnose a disease and dispatch patients to those clinics where they will receive timely and skilled medical care. "The objective of our laboratory is to provide disease prevention by diagnosing concentrations of hormones and biological substances in the environment", explains S. N. Pavlichuk. "The spectrum of diagnosing diseases is wide, encompassing the pathology of the endocrine system, metabolism and oncologic diseases. Equipment manufactured in the Ukraine and sets of standard sera are used for diagnosis. One set is designed for carrying out 40 diagnoses. The idea of opening the first laboratory of its kind in the republic came from Candidate of Medical Sciences Viktor Vasilyev Kuznetsov, the director of the Scientific Research Institute of Oncology. Plans are in the works for expanding the laboratory, thereby making disease prevention available to larger segments of the population. [By L. Aleksandrovna] [Text] [Ashgabat TURKMENSKAYA ISKRA in Russian 10 Dec 86 p 4] 13126/12947

CSO: 1840/456

## BRIEFS

COMPUTER DIAGNOSTICS IN YAROSLAV--Yaroslav, 5 February--We have in our hands an unusual case record--the diagnosis in it was made with the help of a computer. "Surprised?", asks M. P. Vilyanskiy, who heads the surgical department of the Faculty for Advanced Training of Physicians at the Yaroslav State Medical Institute. "When we first became involved in computer diagnostics eight years ago, even our friends--experienced surgeons--had their doubts about this venture. Now everyone is convinced about the advantages of these electronic diagnosticians. In the last five years already, more than two thousand patients have turned for assistance to the remote diagnostics center, which is part of the medical sanitary section of the Yaroslav oil processing plant. Prior to programming a computer to make diagnoses, scientists analyzed data about thousands of patients treated at the clinics over the last decade, selecting the most important and characteristic symptoms and determining how important a factor they are in the overall pattern of the disease. "Nairi"--the name of the domestically made computer operated at the center--could at first diagnose only 22 diseases which were lumped together under the code name "acute abdomen". As time went on, the computer was programmed to diagnose many more diseases. Now, the main "hobby" of the computer is to diagnose gastrointestinal hemorrhage--complex and insidious kinds of diseases. The computer not only recognizes the disease, but helps to choose a rational treatment method as well. "But scientific and technological progress presses ever forward", explains M. P. Vilyanskiy, "and 'Nairi' cannot fully meet present day requirements. Working in close contact with us, one of the Penza plants has manufactured prototype models of a new diagnostics computer. Slightly larger than a common telephone, it may be used effectively by a rural feldshen and a skoraya pomoshch [emergency medical service physician]. [By A. Zhuravel, P. Nikitin] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 5 Feb 87 p 4] 13126/12947

CSO: 1840/456



## PUBLIC HEALTH SURVEY OF FACILITIES DISAPPOINTING

Moscow PRAVDA in Russian 14 Dec 86 p 2

[Article by G. Sazonov, Pravda correspondent]

[Abstract] Last year Pravda sent out a team of correspondents into the field to check out the status with existing health care facilities. A follow up was reported in this article: evidently some of the difficulties were taken care of but many remained unresolved because of poor organization, lack of managerial control and, simply, "foot dragging". This report covers the Buzuluk (described as a typical average city of Rossiya) case, where a new municipal hospital is under construction. Unfortunately, the progress is slow. Several units (childrens hospital, cardiology, infectious diseases units) are behind schedule. Other facilities in the area have taken seriously the constructive criticism of Pravda's reporters but there are still about 30,000 absentees, every day in the Oblast, calling in sick. A point was made that some facilities are underutilized (preventive sanatoria); they should be included in the overall effort to provide more beds for the population.

7813/12947

CSO: 1840/467

## EXTENSION OF PRIVATE MEDICAL PRACTICE IN USSR

Moscow IZVESTIYA in Russian 25 Feb 87 p 6

[Article by S. Tsikora, special correspondent]

[Abstract] As soon as the new law of individual professional activity is passed, the signs of the bygone era will again appear: advertisements of visiting hours of so many physicians. A pertinent interview with V. M. Kozlyuk, Director of Main Administration of Therapeutic-Prophylactic Assistance to the USSR Population is reported. The first issue was the reason for permitting at least some physicians to participate in "individual medical practice". This was based strictly on concern for the individual patient and directed towards the most qualified individuals, according to Kozlyuk. There is a problem in that private offices (usually living quarters of the physician) are not suitable for the expert service expected. Concern was

expressed that this type of private practice may remove the best-qualified individuals from the socialized cadres. However, this objection was discounted as being not important. The difficulty of setting up individual practice in light of the bureaucratic idiosyncracies was mentioned, but the responder said that without practical experience this question could not be answered. The remuneration question was side-stepped noting that each physician has to have his or her own billing chart; however, his/her decision will not be binding on the social medical system. For example, these privately practicing physicians would not be able to give the final medical diagnosis on any cases (supposedly only consultative ability). The issue of special concilia is a problem at hand: which physician does one trust, who should be called in or permitted to participate in a concilium? there are no ready answers. No serious problem with introduction of individual medical practice in the USSR appears to exist.

1840/12947

CSO: 1840/516

#### COMPUTERIZED MEDICAL CENTER TO SERVE KIEV REGION

Moscow IZVESTIYA in Russian 25 Jan 87 p 3

[Article by S. Tsikora, correspondent]

[Abstract] Soon a new medical institution will be opened in Kiev to examine all inhabitants thoroughly and consistently and test them on individual basis. As a rule, physician's help is sought at the nearest facilities, not necessarily at the best. The new center will coordinate already existing outpatient clinics using central data processing and analysis. For that purpose microcomputers have been provided to outlying clinics. It has been already shown that physicians with access to computers are much more productive. A very important aspect of this facility is the ability of all inhabitants to get to the best medical care.

7813/12947

CSO: 1840/465

#### INFERIOR PEDIATRIC CARE IN UZBEKISTAN

Moscow PRAVDA in Russian 7 Feb 87 p 3

[Article by A. Kostikova, P. Volkov and V. Artemenko]

[Abstract] The sad state of pediatric services in Uzbekistan hospitals is reported. On paper everything appeared to be in order, but much of the data were falsified, funds were misappropriated, service was below par, criminal negligence was found. Overcrowding, inadequate staffing, incompetent physicians and general indifference of supervisory bodies had led to this situation. Infant death rate of 55/1,000 and higher appeared to be the norm. Hopefully,

during the next Five-Year Plan, when 59% of the budget will be assigned to health programs, the situation will improve.

7813/12947

CSO: 1840/464

#### STATE-PAID AND PATIENT-PAID MEDICAL CARE

Moscow IZVESTIYA in Russian 30 Jun 87 p 3

[Article by A. Ayzenshtat]

[Abstract] Recently pay-clinics have become increasingly popular among people seeking medical help. What do they offer that other, free clinics do not? Mostly--better patient-physician relationship, especially trust in physician's ability. Annually, the number of clinics, bed and physicians increases but the health status of the population does not. The single, negative reason for this is poor qualification of physicians. The patients believe that it is better to have no physician than a bad physician. Furthermore, the physician qualifications of the physicians in pay-clinics are much better. And yet, normally, there is no reward in free clinics for excellence. It would be better to correct this than to go all out in the direction of paid medicine. The idea of a family doctor appeals more and more. Finally, doctors should be made to pursue postgraduate education courses more often than every five years as is the custom.

7813/12947

CSO: 1840/466

UDC 577.391:547.963.2

(ADP-RIBOSE) -TRANSFERASE ACTIVITY OF ENTEROCYTE NUCLEI DURING RADIATION  
DAMAGE OF SMALL INTESTINE RAT MUCOSA

Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 58, No 5, Sep-Oct 86  
(manuscript received 17 Apr 86) pp 43-49

[Article by T. B. Trofimyak, Ya. B. Blyum, B. F. Sukhomlinov and N. Ye.  
Kucherenko, Kiev University imeni T. G. Shevchenko; Lvov University imeni  
I. Ya. Franko]

[Abstract] (ADP-ribose) -transferase (ADPRT) activity of rat enterocyte nuclei was studied under<sup>n</sup> conditions of radiation damage to small intestine mucosa. Wistar rats weighing 150-200 g were exposed to a minimal lethal dose of x-rays and decapitated 1 to 72 hrs later. Activity of ADPRT was determined by inclusion of [<sup>14</sup>C]-NAD in acid insoluble material in the nuclei. With a 1-15  $\mu$ M NAD dose the incorporation of [<sup>14</sup>C]-NAD had a two-step characteristic; it became classical only with 20  $\mu$ M NAD. Irradiation of animals damaged their enzymatic system of ADO-ribosylation in enterocyte nuclei resulting in distortion of this effect: two maxima appeared after 1 and 24 hrs post-exposure. In the remaining time ADPRT synthesis was diminished reflecting the phase-like course of radiation disease in small intestines. Activation of ADP-ribolysation results from intensified molecular reparation mechanisms of DNA or could represent the response of epithelial cells to radiation. The changed cellular pool of NAD may also play a role in this. Figures 2; references 23: 11 Russian, 12 Western.

7813/12947  
CSO: 1840/502

## IN VIVO DETERMINATION OF REPARATIVE PROCESS EFFECTIVENESS IN BONE MARROW CHROMOSOMAL CELLS BY TEST-IRRADIATION

Kiev TSITOLOGIYA I GENETIKA in Russian Vol 20, No 3, May-Jun 86 (manuscript received 11 Feb 85) pp 174-176

[Article by K. N. Muksinova and T. I. Uryadnitskaya, Institute of Biophysics, Moscow]

[Abstract] Studies of the ability of recovering potential chromosomal damage of plant and animal cells and the effect of this process on the yield of aberrations during action of physical and chemical factors were performed on cell cultures using synchronized populations, repair inhibitors and fractionation of irradiation dose. The goal of this study was to develop a methodology for investigation of the effectiveness of reparative processes in the bone marrow cell chromosomes, under conditions of whole body test-irradiation using Wistar rats exposed to  $^{137}\text{Cs}$  gamma rays at a dose of  $0.85 \cdot 10^{-4}$  A/kg (absorption dose 0.5 Gy). The method is based on comparison of the curves demonstrating chromosomal aberrations yield in the first mitosis following the irradiation. These curves are related primarily to the recovery processes of potential chromosomal aberrations. Figure 1; references 9: 8 Russian, 1 Western.

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